

COMPUTER ON THE ALASKA PIPELINE

DOUBLE TROUBLE Inflation and Unemployment

Part II in the series on business and how it works
Page 18

SAGE TO SPACE TO SONAR. THE FEDERAL SYSTEMS DIVISION

Page 26

Memory. Why you'll never forget what's-his-name

Page 34

Letter from the Chairman

What IBM is doing to protect your privacy



Last year, I told you an intensive examination of our personnel practices was under way to make sure that we were doing everything possible to protect the privacy of our employees. That study is now complete, and I want to report to you its results.

First, our review has confirmed that our philosophy is in keeping with sound privacy principles.

Second, to achieve a balance between employee privacy and the legitimate information needs of the business, we are formally adopting four fundamental practices:

- To collect, use, and retain only personal information that is required for business or legal reasons;
- To provide employees with a means of ensuring that their personal information in IBM personnel records is correct;

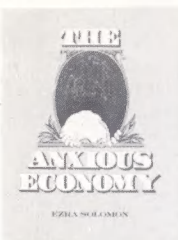
- To limit the internal availability of personal information about others to those with a business need to know;

- To release personal information outside IBM only with employee approval, except to verify employment or to satisfy legitimate investigatory or legal needs.

Based on these practices, we are making a number of detailed changes in our records and procedures. Before the end of the year, we will communicate to managers their responsibility in implementing these practices. In early 1976, we will provide more detailed information about those records containing personal information that each individual will want to review.

As you know, our concern for employee privacy is founded on our basic belief in respect for the individual. This concern has had a pervasive influence on the conduct of our business. Perhaps most significant is the heightened awareness throughout IBM that privacy is, and will remain, a matter of high priority.

Frank Cary



Business, like the consumer, is a victim of inflation—despite those high price tags on everything you buy.

The profits of business, when inflation is stripped away, have eroded too rapidly to keep up with the soaring costs of new product development and plant modernization. Tight money policies needed to rein in inflation have dried up capital markets.

What causes inflation?

Many things. In the mid-'60s, it was deficit spending, due in part to Vietnam and new social programs. It came at a

time when the economy was already operating at close to full employment.

In the late '60s and start of the '70s, cost-push pressures kept inflation going. More recently, a whole new set of factors, some of them temporary, pushed up inflation at an even faster rate.

For a better understanding of these forces and their impact on the economy, read what Ezra Solomon says in Part II of a *Think* series on business and how it works.

Think

Volume 41 Number 5
September/October 1975

Features

Chairman's letter

Letters 3

In Brief 10

What's a Japanese-language
manual doing on Long Island?

15

Viewpoint 48

4 Computer on the Alaska pipeline

It keeps tabs on the logistics, and it's an environmental watchdog as well.

12 Latin American cities—up against it

How A/FE is helping them to focus much-needed attention on their dilemma.

16 Channel ferry

Dover to Ostend. It's safer now; there's a computer aboard.

18 Double trouble. Inflation and unemployment

Part II in the series on business and how it works.
Until we lick inflation, says Economist Ezra Solomon, things can only get worse.

24 International Women's Year

For 16 university women from Europe, a working summer in the U.S. with IBM.

26 Twenty years with the Federal Systems Division

From SAGE to space to sonar. In step with—on top of—the times.

34 Why you'll never forget what's-his-name

How the human mind remembers.

38 Desk-top computer

A portable marvel with the memory of an early System/360 Model 30.

40 Economist Paul A. Samuelson on growth

Some purely personal views from a Nobel Prize winner.

42 Jamboree time in Norway

18,000 scouts, worldwide. With a computer assist from the IBM company there.

44 E Pluribus Europe?

A fresh look at the Common Market and what it means to the business.

Think

The contents of this issue, in brief

MARKETPLACE

Computer on the Alaska pipeline 4

The first gravel road north of the Yukon links mini-boomtowns between the North Slope and Alaska's southern coast. There's a new bridge over the Yukon River. And the ground is being readied for 800 miles of pipe, all of it from Japan, to be laid by the bulk of a 20,000-man work force.

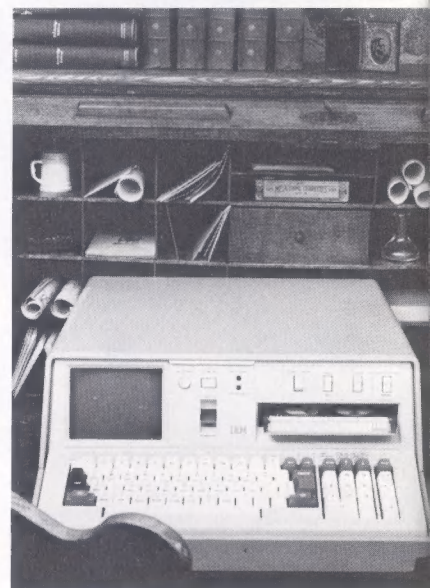
The Alaska pipeline project, the largest privately financed construction program in history, is on its way. Its goal: 1.2 million barrels of oil a day for a fuel-thirsty nation by late 1977. The Alyeska Pipeline Service Company, a consortium of eight oil companies, is in the middle of all the action; and IBM equipment at its Anchorage headquarters is giving engineers, environmentalists, and government scientists the information they need to keep pace with the rush of events.

Double trouble Inflation and unemployment 18

"Inflation is the central problem of our time," says Stanford University economist, Ezra Solomon. It has caused both the recession and unemployment. And neither will be licked until inflation is cured.

In Part II of *Think's* series on business and how it works, Solomon tells how inflation got going; why it leaped into double-digit figures; and how deficit financing during boom periods helped aggravate the malady.

What lies ahead? Although the economic "Discomfort Index" remains high, Solomon believes that both inflation and unemployment can be reduced at the same time. Purchasing power, he points out, has already begun to rise.



THE WORLD

Latin American cities— up against it 12

Latin American newspapers report a brisk business for psychiatrists and tranquilizer producers these days in that hemisphere's large cities. The urban blues have gone south of the border, and they're afflicting everyone—from the business executive whose high-rise apartment terrace is wreathed in smog, to the mother patching the roof of the tin shack her family must call a home. Attention must be paid. That's why IBM's Americas/Far East Corporation helped sponsor a 14-nation conference on urban development—Latin America's first. It was held in Bogota in August, and while it didn't come up with all the answers, it at least asked some hard questions.



E Pluribus Europe? 44

For Europe, there seems to be no turning back. In April, two-thirds of the British people voted to have their country remain in the Common Market. Differences in point of view remain, but the nine member nations are now as close as they've ever been in common outlook.

In the 28 years since the Marshall Plan helped Europe to its feet after World War II, there has been steady—though not uninterrupted—movement

toward European unity. Within 12 years of the signing of the Treaty of Rome, trade among the original six members increased 530 percent. Now Europeans have some very definite ideas about things like the computer industry.

Letters

Desk-top computer

38

It has the memory capacity of an early System/360 Model 30, yet it's small enough to carry. What's more, the price is right—not much more than a good-sized luxury automobile. That's IBM's snappy little stand-alone 5100 computer. Announced in September, and demonstrated in city newsrooms across the country, it brightens the General Systems Division's sales scene.

THE COMPANY

Twenty years with the Federal Systems Division

26

Technologically speaking, nearly everything that FSD does today stems in some way from a pair of giant early undertakings. The SAGE air defense system, which first got IBM into massive real-time computers and programming. And the B-52, which spurred the development of rugged on-board computers, first on aircraft and later in space.

Twenty years after the division's founding, the nation's defense priorities have changed. But the talents of FSD's 11,000 people enable the division to continue to play a leading role. In a few short years, they have made IBM one of the most knowledgeable producers of sonar equipment for the nation's growing fleet of nuclear submarines.

Whose Rubaiyat are you reading?

Re the July/August issue of *Think* Magazine, I would like to call your attention to a small piece of misquoted literature.

On page 16, where the article on IBM's operations in Iran continues, the few lines from the *Rubaiyat* are to be found.

Omar Khayyám did indeed exist. The *Rubaiyat* was, however, the work of Edward Fitzgerald, first published in 1851. There were several editions of the "translations" to be found; first in England and then in the United States.

The closest to the verse in *Think* I am able to match, is of the fifth edition of the "translation," in stanza LXXXVII:

"Whereat some one of the
loquacious Lot—
I think a Sufi pipkin-waxing hot—
'All this of Pot and Potter—
Tell me then,
Who is the Potter, pray, and who
the Pot?'"

Perhaps you have quoted from the writings of Omar, himself, in one of his treatises on Algebra or whatever. I would appreciate knowing your source, in any case.

Harold B. Mandel
Elmira, N. Y.

Editor's note: We may have snubbed Fitzgerald unintentionally, but we didn't misquote him. The lines printed are one version of that stanza and appear in a 1901 analysis of the Rubaiyat. Yet another version, which could have fittingly ended the Iran story, is this one, from the 1961 translation of Robert Graves and Omar-Ali-Shah:

*"I saw at least two thousand pots,
last night
In Potters Row, not all of which
were mute,
And one cried loudly: 'Friends,
where is the Potter,
Where is the salesman, where
the customer?'"*

Heilbroner flunks the course on thermodynamics

Robert L. Heilbroner's article on Growth (July/August issue) takes two-thirds of the space provided to explain such a trivial concept as exponential growth in seven different ways. In the process, he also contradicts his own theory with von Liebig's theorem and caps the whole nonsense

with a statement, "... the greatest challenge, we must learn how to generate energy without pouring man-made heat into the atmosphere."

As the readers of *Think* know the laws of thermodynamics, they will politely ignore the challenge.

Borut Prah
Oakland, Calif.

Too much Friedmania?

Think should have disclaimed the hysterical Friedmanian view of growth-planning (July/August '75) rather than the well-reasoned views of Heilbroner. Friedman sets up straw men to battle: "central planners," "turn our lives over to them," "another Federal agency to control our daily lives." Uninformed hysteria!

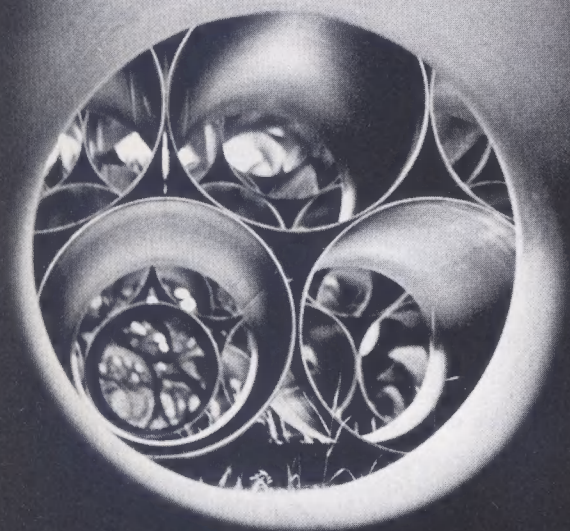
The proposed Balanced Economic Growth Plan would "establish economic objectives" for the United States, "identify the resources required," and "recommend legislative and administrative actions" (see Section 208 of the bill). Further, Section 209 calls for "widespread consultation with regional, state, and local planning agencies," provides for the inclusion of "the views and comments of citizens . . . after public hearings have been held," and Section 211 affirms that "Congress shall . . . approve or disapprove" the plan. The object is more democratic (bottom-up) economic planning.

As Heilbroner points out, "adverse reactions from the supporting environment begin to slow down the growth process." If we *Think* about these problems, we may avoid the consequences of the adverse reactions and achieve a stable and therefore healthy economy before adversity besets us. And that thinking will be most effective if it is organized. Thus the need for a Balanced Economic Growth Plan.

E. Todd Waymon
Annandale, Va.

Think welcomes letters from readers, commenting on articles or offering suggestions and criticism. Please write to:

The Editor
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COMPUTER ON THE P

ALASKA

PELINE

ALASKA



by Howard K. Janis

It has been said that the cycles of boom and bust which sweep Alaska are like the summertimes of Arctic plants—bright splashes following the long-night wintry seasons of darkness.

The fur trade, whaling, gold—each had its day—and in the Yukon the cabins of trappers stand empty in the woods; the tailings of miners mound the hills like graveyards.

Now a new boom has come with the finding of oil—it dwarfs all others—and it is bringing both prosperity and problems to this immense land.

In territory once so remote it was known only to caribou and moose, a vast American oil reserve beyond the Arctic Circle will be tapped for the first time to help supply the nation's petroleum needs. Within a time frame of just three years, at a cost exceeding \$6-billion, the pipeline, by late 1977, will be pumping 1.2 million barrels of oil a day.

'The Arctic has a call
that is compelling.
The distant mountains make
one want to go on and on
over the next ridge and over
the one beyond.
The call is that of a wilderness
known only to a few.
It is a call to adventure.'

My Wilderness: The Pacific West,
by William O. Douglas

Planned capacity is 2 million barrels a day—equivalent to 7 or 8 percent of present U.S. consumption. It's estimated that about 10 billion barrels of oil can be produced from the Prudhoe Bay fields alone.

Oil will flow through the 800-mile-long pipeline from the North Slope on the Arctic Ocean to a storage and terminal installation being constructed in Valdez, on Alaska's southern coast. There, giant tankers from West Coast refining centers will ply the ice-free waters of Prince William Sound year-round. To reach the port, the pipeline will cross three mountain ranges, 34 rivers, including the waters of the Yukon, hundreds of streams, and an earthquake zone.

To make all this happen in record time, while maintaining environmental safeguards, the largest—and most ambitious—privately financed construction program ever undertaken is being carried out by the Alyeska Pipeline Service Company, formed by a consortium of eight oil companies. The Russian-sounding *Alyeska* is the Aleut word for Great Land, which, in English, became Alaska.

Between Prudhoe Bay, on the North Slope, and the Yukon River, which flows westward from Canada into the Bering Sea, 15 camps—11 with their own airfields—are home for some 12,000 of the approximately 20,000 pipeline workers. While construction goes forward, these camps with names like Happy Valley and Coldfoot will take on the appearance of small towns of 500 to 1,000 people—all workers, without their families. Last October, a gravel road, the first ever built north of the Yukon, was completed along the pipeline route, linking the camps.

Just to build that two-lane road required mountains of gravel to be placed anywhere from 5 to 20 feet deep. The pipe itself—all of it from Japan—was stored in Valdez, Fairbanks, and Prudhoe Bay. More than half the pipe will be buried, including some seven miles that will be installed over refrigerated pipes to prevent thawing of the

underlying permafrost. Some of the pipe is buried in permafrost in order to construct special animal crossings.

Ultimately, the pipeline will have 12 pump stations and some 185 remotely controlled shut-off valves for flow control or use in case of oil leaks. Eight pump stations will have their own mini-refineries to convert enough crude oil to operate the turbine-driven pumps. Eventually, in Valdez, the oil will flow into 32 storage tanks—each 250 feet in diameter—resting on bedrock for maximum resistance to earthquakes.

More than 7,000 contractors, subcontractors, and vendors—including IBM—have already taken part in the project.

IBM is involved at the very heart of the project's management, at Alyeska's headquarters data center in Anchorage, where a System/370 Model 135 provides day-to-day control of the accounting and logistics of pipeline construction. Since the computer's installation last year, supplementary storage and printing capabilities have been added, and new requirements are still being defined.

"The step-by-step tasks number in the millions," says George M. Nelson, Alyeska's vice president for administration. "They could not be kept track of in any way—except by computer."

Five System/3s have been installed just to handle the payroll and other needs of the five pipeline subcontractors.

Jack Jessee, senior marketing representative in the Anchorage office of the Data Processing Division, heads the Alyeska account marketing team, which includes Systems Engineers Terry Callaway and Jack Wirkkala. Jessee, who also works closely with several of the major pipeline contractors, moved to Anchorage early last year from Chicago with his wife and five sons. He had had his sights set on an Alaska assignment ever since the family spent a vacation there four years ago.

"It's the opening up of Alaska," Jessee says of the pipeline. "With

the new road in place, the whole Yukon Valley, which has a liveable climate comparable to Fairbanks, now becomes accessible for the first time." The permit to build the pipeline came through in February 1974, he recalls, and from that time to today the IBM team has helped Alyeska cope with the data management of the massive project—ranging from road and campsite construction to the present support of the work force of 20,000 people.

The IBM marketing team is assisting Alyeska with its emergency plans in case of oil leaks—contingency planning that must be translated into information for the computer. "They've got to be ready for any kind of emergency," says Jessee, "anything from a small oil leak to an earthquake rupture or a tidal wave—and all at the same time."

Spillage detection is so sophisticated that a loss of as little as 10 gallons an hour will be sensed and pinpointed at a particular valve, or within a mile of a break. Sensing devices along the pipeline will transmit this emergency data to non-IBM process control computers at the Valdez terminal facility. From there, the System/370 will instantly trigger a plan of action for people, equipment, and supplies to move swiftly to any emergency scene. Supervisors at the control center may accept the computer-printed instructions, modify them, or request alternatives.

Eventually, there may be seven repair crews of up to 100 people each along the pipeline. If a break should occur, tanks at the pumping stations up to the point of rupture will be capable of storing oil while repairs are made.

Among the IBM computer's roles in support of construction of the pipeline:

- An inventory system to record and track every piece of material used in the pipeline, from pipe sections to construction equipment, including some 40,000 spare units and "consumables." Among the consumable items: 15,000 sets of Arctic clothing—boots, parkas,

(Continued on page 8)

SOME LAND!

If you were to lay a map of Alaska on a map of the "lower 48"—as Alaskans refer to the continental U.S.—it would reach from California to Mississippi, from Mexico to Canada. The state covers 586,400 square miles and has more coastline than all of the other coastal states combined.

Legend notwithstanding, Alaska is not a land of perpetual ice and snow. While the Eskimo community of Barrow is only 800 miles from the North Pole, Anchorage, the largest city, lies in roughly the same latitude as Helsinki; and Juneau, the capital, the same as Stockholm. As one goes north, winter days grow shorter and summer days last longer—19 hours or more. The thaw—called "breakup"—comes some time in May; the first snow falls usually in late September. But, of course, it sticks for a while.

In the long summer days, farmers grow huge vegetables in the Matanuska Valley, near Anchorage, and 50-pound cabbages are not uncommon at local fairs. In Fairbanks, summer temperatures can reach 100°F.

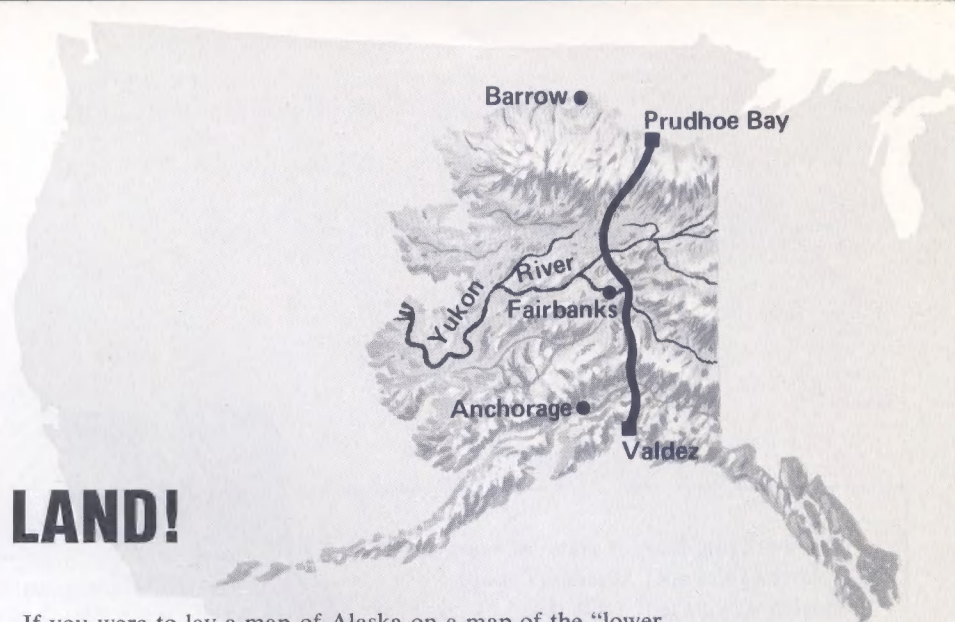
IBM people are typical of Alaska's residents in their liking for cold weather sports, such as cross-country skiing, snowmobiling, and hunting for moose, caribou, and sheep. Says Dee Sharp, who came to Alaska from New London, Conn., via Fort Lauderdale, Fla.: "I prefer a climate below 60 degrees. And if you have a spirit of adventure and a feeling for beauty, you get used to the sub-zero cold very quickly."

Fairbanks, major base for the pipeline project, has a population of about 31,000, "double what it was when we moved up here 15 years ago," says Keith Jelinek, a customer engineer with the Field Engineering Division. He arrived with his wife from California on a three-year assignment, but "didn't see any reason for leaving." Their five children were born in Fairbanks.

Most IBM customers in Fairbanks are in the downtown business district, which, in 45-below-zero weather, is about as far as anyone would feel safe driving, even with an Arctic survival kit. Customers include the school district, a construction company, a propane gas company, a newspaper, and the City of Fairbanks, which operates telephone, electric power, water supply, and steam systems.

From Fairbanks, too, planes shuttle people and equipment to the pipeline campsites, where secretaries work on a one-week-on, one-week-off basis at salaries of up to \$800 a week. Marketing Rep John Lincoln, who leads the tightly knit OPD team there, is a hunting and skiing enthusiast, flies his own Super Cub, and delights in daylight fishing at 11 p.m. in summer.

"This is where I've found real action and unspoiled outdoors enjoyment," says one IBM employee. Most Alaskans agree, and wouldn't dream of being anywhere else.



Spillage detection is so sophisticated that a loss of as little as 10 gallons an hour will be sensed and pinpointed at a particular valve, or within a mile of a break.

(Continued from page 7)

and thermal underwear—as well as food.

- An accounts-payable application to keep track of everything Alyeska orders or contracts for, and expends against commitments, making possible computer projections of costs, budgets, and payroll.

- Engineering files and databanks relating to the pipeline design and the various permits required from the Federal and state governments—permits, for example, to build the camps, or bridges across rivers.

- Design information retrieval to enable Alyeska to prove to government observers its detailed compliance with environmental requirements—information that must be available every inch of the way. Those strict requirements evolved during a five-year controversy stirred in 1969, when a permit was first sought for the pipeline. The Environmental Policy Act that year sent those seeking the pipeline back to their drawing boards.

Environmentalists and government scientists said the original proposal looked like the plan for any other pipeline. They warned of the problems of sinking a hot oil pipeline in permafrost; of the need for research planning; and protecting fish, wildlife, and vegetation. As a result, geologists, archaeologists, biologists, botanists, oceanographers, and wildlife specialists came up with recommendations that were incorporated in the plan finally accepted

as environmentally sound. The modifications, many of them major, increased costs significantly but also improved the pipeline from an engineering point of view.

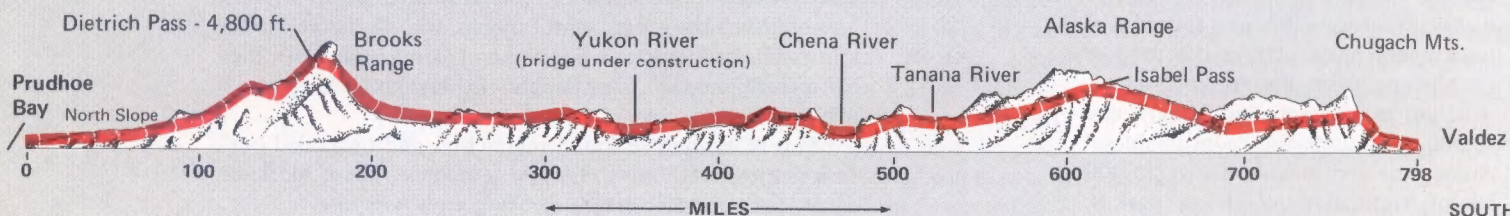
- Engineering specifications verification as the pipeline construction proceeds. Which section of pipe to put where has already been determined and the information stored.

Last year, as Alyeska's subcontractors raced to set up offices in Fairbanks, Anchorage, and Valdez, IBM raced right along with them, delivering typewriters, Copiers, and other word processing equipment. The Office Products Division branch office in Anchorage, which serves all of Alaska, ranked third in sales in the division in 1974 and is continuing ahead of plan this year under Branch Manager Dennis E. Garcelon.

"The amount of paper work generated by building a bridge across the Yukon River is astronomical," says Jerry Thompson, an OPD Anchorage marketing manager, who's involved in much of the pipeline business. "Or, if you take just the paper work required for the environmental report, that's 60,000 pages alone. Everything that makes the pipeline project work is supported by a piece of paper, and almost every piece of paper generated by the pipeline business comes through an IBM typewriter of some kind."

Most OPD products are shipped to Alaska from St. Paul, Minn. From there, it's a three-week road trip via the

Profile of the pipeline



Alcan Highway. Customers are being asked to anticipate their word processing orders to avoid delays. Costly air freight is used only in the direst of emergencies. In the current boom atmosphere, however, need often outstrips even the most optimistic plans.

As secretarial costs escalate—living costs in Alaska are 45 percent higher than in the rest of the U.S.—OPD products are in great demand. They turn out more paper work faster, more conveniently, and, says Thompson, more economically. “The Communicating Mag Card Selectric can sure beat the mail from the North Slope.”

OPD Anchorage Branch Manager Don Langworthy is optimistic: “Prospects for Alaska’s continued economic growth are excellent.”

But no one in Alaska expects growth without many pains. For some, lured to Alaska by glowing stories of sky-high wages for pipeline work, the pain is deeply personal, a matter of disappointment and exhausted funds. Despite the rosy reports of some promoters, there are far more people than jobs, and Alaska residents get preference in hiring.

Along with this unemployment, worst among the newcomers, many native Alaskans face a kind of spiritual dilemma as people and commerce begin to make inroads on the splendid isolation that many cherish as their own paradise.

Johnny Frank, a 95-year-old Athapaskan Indian who still cuts wood for a living (with an axe, not a newfangled chain saw), summed up one point of view when, according to an article in *National Geographic* on the 49th state, he said to a visitor: “Oil people, too many different brain, too many big shot. People are too crazy in the heart for money.”

Perhaps, continued the article, but it is also true that there is good will and a strong attempt to do what is right—for the land and for the people who inhabit it. ■

Howard K. Janis, formerly with Think, is now a program administrator in A/E internal communications in Mount Pleasant, N.Y.



Life-style?

How to handle a frozen mustache: Anchorage Marketing Rep Dick Bethka recommends letting it thaw out naturally. He hasn't yet figured out how to keep it from freezing in the first place when the temperature is 50 below zero.

Jack Wirkkala, advisory systems engineer in the OPD Anchorage branch, is an avid hunter. He and a friend often fly into the wild country in a Super Cub with large tires that enable it to land on tundra, sand bars, and mountainsides. Last year they had a real challenge: dressing a moose with a 58-inch, 75-pound rack of antlers, then loading the 1,000 pounds of meat into their small plane.

What do you do when you see a big brown bear or a pair of wolves romping in your back yard? Nothing at all—but do it indoors—says Dee Sharp,

IBM secretary to Anchorage OPD branch manager, Don Langworthy. “They’d really rather stay away from people,” Dee insists.

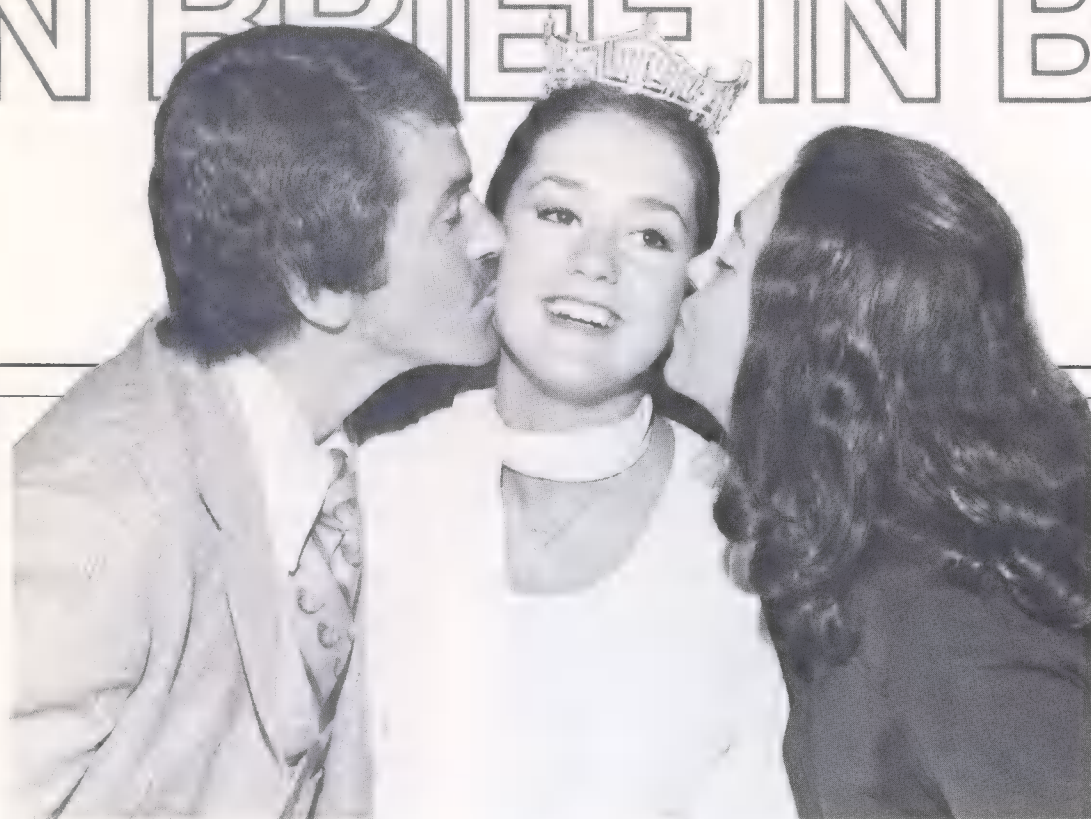
Recipe for a mid-winter Alaskan picnic: An Athapaskan Indian concoction of lard (because it doesn't freeze), blueberries, and ground fish. “It beats going hungry,” admits Dick Bethka after sampling this on a snowmobile hunting trip in 30 below zero weather, after his own sandwich lunch cracked with cold and shattered on the ice.

IBMer Judy Classen hasn't bought beef in more than a year. Prices are too high in Fairbanks where she and her husband, an Army helicopter pilot, live. A keen shot with a “30-ought-six” rifle, Judy stocks her home freezer with the moose, dall sheep, wild goat, ducks, and geese she and her husband bag on their frequent hunting trips.

Eleni, wife of IBM Systems Engineer Bill Andrews, grew up on a sun-bleached Greek island and never saw snow before she accompanied Bill to Anchorage three years ago. Now she is teaching her elementary school class how to cross-country ski. Andrews is from Douglas, an island community near Juneau, where his maternal grandparents settled around 1870, in the gold rush days. The couple met at San Jose State College.

School's out in Fairbanks! But only when the weather gets down to 40 or 50 degrees below zero. Even then, school's not closed because of cold, but because the fog becomes so thick in the settled areas it isn't safe for youngsters to be outside waiting for the bus. But back in the winter of 1961, Keith Jelinek recalls, after 10 consecutive days of minus 65 weather, *everything* shut down.

IN BRIEF IN BRIEF



*She's their winner.
Tawny Elaine Godin with parents
John and Connie.*

Miss America

It's called the Empire State, but one crown had eluded New York for 30 years: a Miss America title for its representative in the national competition. Tawny Elaine Godin changed that on September 6, when, as Miss New York State, she was chosen Miss America 1976 in Atlantic City, N. J.

Her parents are John and Connie Godin of Yonkers, N. Y. Her father is program manager of advertising activities at IBM's Americas/Far East Headquarters in Mount Pleasant, N. Y.

The new Miss America was chosen from among 10 finalists. She is a languages major at

Skidmore College and studied for six years at Toronto's Royal Conservatory of Music. In the talent competition at Atlantic City, she played an original piano piece. Her victory brought her a \$15,000 scholarship to continue her studies.

From right to left

You don't have to be an Israeli to appreciate the IBM Selectric Kadurit Typewriter.

That's the word from Dr. Charles Berlin, who heads the Hebrew Department of the Harvard University Library. Harvard has just become the first U.S. customer for the Selectric Kadurit ("little ball" in Hebrew), which is made in Amsterdam for the Israeli market.

As anyone who knows Hebrew will tell you, that ancient language is written from right to left across the page—something both the Selectric Kadurit and earlier-model IBM Hebrew typewriters accomplish with ease. The Selectric Kadurit, though, also writes from left to right. So, if

International exchange

A product line manager and a director flew in from Paris. Two sales managers came from Sweden and Germany. A general manager from Vienna. A managing director from Johannesburg, South Africa.

There was a difference about this summer's IBM Executive Program, held at the Harrison Inn in Southbury, Conn.—the first official International Executive Program. The majority of the 16 participants were from IBM World Trade—9 from the Americas/Far East and Europe/Middle East/Africa Corporations; 7 from the U.S. company.

For two weeks, the executives

shared cultural backgrounds and views with IBM top management and selected outside speakers on matters of concern to all: the operations of the Corporate Office and the Data Processing Product Group; headline-making public issues; activities of the European Economic Community; and changing trends in world politics, finance, and trade. They studied the international corporation under attack.

The lineup changes, but IBM's management development goal remains the same: to direct the diversities of many talents into a cohesive management team.



To catch a thief

The three escaping prisoners are armed, desperate, and dangerous. They've taken several hostages, and stolen a prison car. Out goes a call from the sheriff's office—some 35 miles away—summoning 200 deputies and other law officers to the courthouse to set up a quick dragnet of roadblocks and stakeouts.

There's a hitch. Except for a couple of photographs the sheriff has, nobody knows what the prisoners look like.

Enter, a local F.B.I. agent who has been busy at the courthouse, using the IBM Copier II to make mug-shot copies of those on the F.B.I.'s most-wanted list.

"Give me the pictures," he says, and disappears. He's back within minutes, and the

IN BRIEF IN BRIEF

you're typing in Hebrew and want to insert a few English terms—or produce a bilingual library card—all you do is flip a switch, change to an English-language type element, and away you go. Keys on the Selectric Kadurit are marked in both languages.

Cataloging the thousands of Hebrew books, which the Harvard library department adds each year to its extensive collection of Judaica, has been a laborious task—up to now—with much shifting of cards between side-by-side Hebrew and English-model typewriters. No more.

The department also plans to use its new Selectric Typewriter to order more books for its collection.

men from the sheriff's patrol, the state police, and the F.B.I. are on their way, each with a clear, accurate, front-and-profile shot in hand.

It happened at the Jefferson County Courthouse at Pine Bluff, Ark., last July. Two of the prisoners, who escaped from Cummins Prison, were captured the next day in Warren, Ark., 40 miles away. The third was caught 12 days later in Oregon, Mo.

The courthouse Copier II is back at its usual routine tasks—copying court records, birth certificates, deeds, and other legal fare. But for more than a few days, says OPD Advanced Marketing Rep Rick Anderson, who handles the account, the job it did in apprehending those three lawbreakers was the talk of Jefferson County.

Good habit

In December, IBM helped bring the Archaeological Finds of the People's Republic of China to the National Gallery of Art in Washington, D.C. The beautiful, awesome objects, centuries old, stayed through March and were seen by nearly three-quarters of a million people. Later, again with IBM sponsorship, they went to San Francisco.

In May, New York City's Whitney Museum of American Art mounted an exhibit of the work of Jacob Lawrence, a distinguished contemporary black artist. The Whitney was assisted by a grant from IBM.

This fall, the New York Philharmonic has just completed a tour of England, Belgium, Germany, France, and Switzerland, the trip underwritten, in part, by a grant from the IBM World Trade Corporation.

For contributing so "meaningfully" to the arts, IBM has once again, for the fourth time in nine years, received a "Business in the Arts" award. The award is sponsored jointly by *Esquire* magazine and the Business Committee for the Arts, Inc.



High-rising star

Ever since Mayor Richard J. Daley pulled its dedication ribbon in September 1972, Chicago's One IBM Plaza has been an attention grabber: For tourists—an eyestopper on the city skyline. For Mies van der Rohe enthusiasts—the last major American statement by that late, great architect. And it has been heralded in the nation's press as "what may well be the most important skyscraper in the country."

Now, the Federal Energy Administration reaffirms that the good and the beautiful can be efficient, too. In July, it awarded to IBM and Scribner Management Company, the firm that manages the building, FEA's first Midwest Excellence Award for Energy Conservation.

The energy star's record, accomplished with a good deal of help from an IBM sensor-based computer: a 36 percent

saving in lighting, heating, and cooling during the first year of an energy conservation program that began June 1, 1973, and an additional 9 percent reduction in the beginning of the second year.

For the company as a whole, in 1974, fuel savings by 33 major IBM domestic plant, lab, and headquarters locations amounted to 31.7 percent, and electric savings, 22.8 percent, from preconervation levels.

In Latin America, too,
the cities are

**UP
AGAINST
IT**





It's not easy to get a private telephone in Rio de Janeiro; sometimes it takes three years. It's hard getting a taxi, too, and when you do, you pay a fare that has gone up 300 percent in the last three years.

Inconveniences and expenses like these are the price Latin America's cities are paying for their rapid economic development. The price gets more onerous as the cities grow. Those with a population of 250,000 are expected to quadruple in number by 1980. Some forecasts have nine of every ten Latin Americans living in urban centers by the end of the century.

Telephones and traffic are only part of the story: the other, more devastating part is the urban slum. In one major city, one-third of the population lives in mud-brick slums; in another, infant mortality has increased 25 percent in the last 10 years.

Conditions and statistics like these—and the prospect of more—have led Latin Americans to question the pace of urban growth and to look for ways to control and humanize it. This dialogue was given an important forum in August, when government and university officials from 14 countries met in Bogota, Colombia, for the first Latin American Conference on Urban Development. The meeting was organized and sponsored by that city, the University of the Andes, and IBM's Americas/Far East Corporation.

Among the guests: John V. Lindsay, New York City's former mayor, and Jean Taulelle, prefect of Paris, both of whom spoke of the comparable problems of North American and European cities. Dr. David L. Grove, IBM vice president and chief economist, emphasized the need for a national focus on urban problems. All speeches and discussions were simultaneously translated into English, French, Spanish, or Portuguese.

The conference began by acknowledging some hard demographic realities: Latin American birth rates remain high; mortality rates are declining; and the exodus from rural areas to the

cities continues. (In Argentina, ■ projected 7 million people will be added to the urban ranks in the twenty-year period ending in 1979; in Mexico, 24.5 million over the same span.)

Given such numbers, what can be done? This was the question that dominated the three days of discussion.

"Local governments in both North and South America," said Lindsay, "increasingly will face the impact of problems that relate to the mass movement

of people and goods, the cleansing of the air and water, and a host of other problems." He called for "an intelligent balance" in the planning for industrial and residential space.

"I believe it is possible," Lindsay said, "for public institutions to bring the people into a share of the action." He said this applied to essential municipal services like law enforcement, sanitation, education, and transportation. Nevertheless, he pointed out: "There

can be no substitute for national concern."

Dr. Grove stressed that, to be assured of that national concern, municipal officials everywhere must arm themselves with facts and ideas. "They will be listened to only if they have a good case—a case as carefully prepared as that of any ministry of the national government," he declared.

On the conference's closing day, a new urban planning policy was pro-

Easing those

"Computers help people make cities more liveable," reads the headline on one of A/FE's advertisements, which appear in 40 Latin American and Far East countries.


Never have cities needed that help more.

Many urban problems are information-handling problems. Even in small cities, there is so much for government or business people to weigh and evaluate. In addition to all the accounting and administrative tasks, computers can help provide options and alternatives to those who must plan needed programs. This is particularly critical in financial planning now that so many cities find costs outrunning revenues.

In new cities like Makati, where IBM Philippines has its headquarters, the planning and weighing of alternatives are vital. Housing, office buildings, traffic patterns, schools, and parks—the whole fabric of a city can now be planned more logically and accurately through the use of computers.

Here are some examples of computers in action in A/FE urban areas:

- Beginning next January, a new regional program will assist the four million people in the Bogota public health system. As part of this program, an IBM System/370 Model 135 and more than 80 terminals will be used to track information on available beds, laboratory tests, patients, and doctors in 42



Bogota's skyline is dominated by the mountains of La Guadalupe and Monserrate, but man-made structures are rising rapidly in the busy downtown area. The Colombian capital now has a population of 3.4 million. Its many educational institutions have earned Bogota the title of the "Athens of South America." One of those institutions, the University of the Andes, helped organize last August's conference on urban affairs held in the city.

憶

claimed by the city of Bogota. In their summing up, the Brazilian delegation recommended ways to dovetail the planning of local, regional, and national governments. And the University of the Andes announced it was forming a task force for urban affairs.

"Those are the things we wanted to hear," said one member of the conference as he collected his papers. "Discussion is good, but action is even better. I think we've made a beginning." ■

growing pains

outpatient clinics, 13 hospitals, and 2 laboratories. A similar network is planned for Rio de Janeiro, which has 10 million people dependent upon its public health system.

- In Canada, the Department of Social Services in Metropolitan Toronto uses an IBM management information system for its community assistance programs, including housing for the elderly.

- At IBM Japan's Scientific Center in Tokyo, an environmental control group works closely with government people in the Hyogo Prefecture on air pollution simulation models and the Hyogo Dynamics project.

Hyogo Dynamics is a forecast of social and economic conditions in the area for the next 50 years. This study was presented and explained in various parts of the prefecture, which includes the city of Kobe, a neighboring industrial area, and fishing and farming villages. The study is expected to enable people to participate in the plan and give their views to the planners.

- In Mexico City, IBM computers are being used in planning for a new sewage system and in converting electricity to different voltage.

- In New Zealand, IBM computers are helping to speed engineering and design decisions as well as to minimize the costs of urban renewal and other government construction projects.

What's a Japanese-language machine manual doing on Long Island?

Ask Takemichi (Toby) Suzuki; he arranged it. ■

Suzuki is one of 16 men from 10 countries assigned to IBM World Trade's International Sales Office in White Plains, N.Y. Their job: to arrange the most meaningful U.S. itineraries for IBM customer executives visiting from their home countries. That's basic. What is more and more part of that job, however, is the help given IBM's DP Division sales people who have the U.S. branches of foreign firms as accounts. That help is doubly welcome when those accounts are Japanese.

Canon, Minolta, Mitsubishi, Seiko, Sony, Toshiba, Toyota—a partial list of them reads like the Tokyo business directory. All are located in New York or New Jersey. Some have branch offices in other parts of the U.S. and Canada. Their top management, without exception, is Japanese.

"That can make it rough," says Frank Konop, a DPD marketing representative whose accounts include Canon Camera in Lake Success. "Often you're dealing with an executive who has difficulty expressing himself in English—and who must be seen, because in a Japanese company, even in the States, it's the man at the top who makes all the important decisions."

That's where Japanese ISO representatives like Toby Suzuki enter the picture. Recently, he helped Canon decide on an IBM System/370 Model 125 by meeting with executives visiting from Japan. Afterwards, he got that machine manual from Tokyo for the Japanese data processing manager out at Lake Success.

In August, Suzuki went to Mitsubishi International's headquarters on Park Avenue in New York City. There, he, Bob Moncello, international accounts manager, and Shelly Ratner, senior marketing representative, met Mitsubishi's new president for its U.S. operations.

"The help we get from ISO is invaluable," Moncello said later. "It might be with a technical matter or just a language problem. But it's always there."

When his assignment began, Toby Suzuki wondered how many chances, outside of his own home, he'd have to speak Japanese. Quite a few, as it's turned out. ■

Channel ferry

Now there's a
safety-conscious
computer aboard

by Ed Grimm

When the *Prins Philippe* arrives at Dover, the big ship's bow-thrust propeller enables her to dock laterally. Like a dowager easing into an aisle seat at the opera, she comes to berth. It has been an uneventful three-hour crossing of the English Channel from Ostend, Belgium—and no one is complaining.

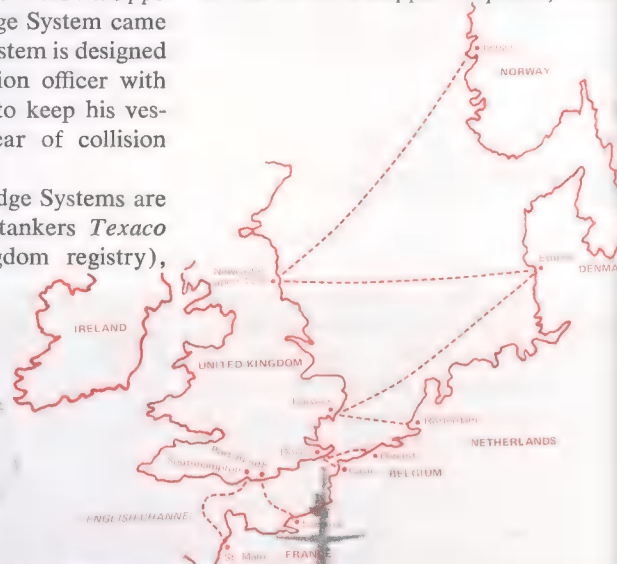
The uneventful Channel crossing has become standard for the *Prins Philippe* ever since an IBM Bridge System came aboard last year. The system is designed to provide the navigation officer with the readings he needs to keep his vessel on course and clear of collision dangers.

Three other IBM Bridge Systems are now aboard the supertankers *Texaco Sweden* (United Kingdom registry),

AGIP Sardegna, and *Esso Wilhelms-haven*. Others have been ordered for vessels flying the Japanese, Danish, Norwegian, Italian, and American flags.

Because ships are expensive to build and operate today, and insurance rates high, an accident at sea—no matter how minor—can be a melancholy entry in the log book of any voyage. The Liverpool Underwriters' Association reports that each year one of every 14 ships above 500 gross tons is involved in a collision; and it is estimated that 73 percent of all collisions are due to human error. That error may come from not interpreting radar observations quickly enough or misreading radar data. When visibility is bad or traffic heavy, the odds against an error-free voyage grow longer.

"It's not that there are that many more ships," says Roland Bedert, one of the *Prins Philippe's* captains, "but



they are bigger and they go faster.” (One study foresees 12,409 tankers and bulk carriers sailing the world’s waters by 1980.) Captain Bedert is a stocky, ruddy-faced man who once sailed three-masted schooners to Africa, and hauled timber from the Baltic Sea to the Mediterranean. He lives in Ostend, and he has crossed the Channel more than 2,000 times. “Each one of them,” he says with a slow smile, “has been different.”

That is what adds drama to the voyage—even on so seemingly bland a day as this one.

The *Prins Philippe* is part of the Belgian *Régie des Transports Maritimes* fleet. Measuring 5,000 gross tons and 120 metres long, she can attain a speed of 22 knots.* She can carry 1,300 passengers, and either 200 cars or 170 cars and 14 large lorries. In two years, she has made 2,500 Channel crossings between Dover and Ostend.

The IBM Bridge System aboard her was developed in Boca Raton, Fla., by an IBM team with maritime backgrounds. It is normally connected to a ship’s radar, speed log, gyrocompass, and other navigational devices. The system consists of a ruggedized System/7 and a bridge console. The System/7 can be placed below decks as far as 200 cable feet from the bridge. The bridge console has two viewing screens, allowing the navigation officer to see information displayed in both graphic and tabular forms. There is a keyboard for him to use when he must enter data into the system or ask questions of it.

A few moments after the system is switched on, it displays its readiness on the screens. The navigator enters the day and time. Then the system begins searching the entire area within 16.5 nautical miles for radar echoes that represent ships. Echoes arising from land masses or “sea clutter” are filtered out. Echoes labeled as targets are assigned identity numbers and automatically tracked for speed and course.

The 21 most threatening targets are continually tracked and displayed, six at a time, for their range and bearing, course and speed, closest point of approach, and time to closest point of approach. When a new target enters the list of the foremost threats, the navigator is warned—by lights, messages, and a buzzer.

Working from charts and other pertinent information, the navigator uses the keyboard to tell the system which route to sail. The system calculates and displays the course and the distance to

the next turn, and it warns the navigator when a turning point will be reached. As many as 99 routes can be planned and stored.

Once the navigator sets the route boundaries, the system uses this data to track the vessel inside those boundaries. It calculates the position and proposes the course changes made necessary by the action of wind, currents, and waves. This keeps the ship on course in open seas; it also ensures safe passage through close waters, especially shipping lanes and harbor entrances with hazardous shoals.

Many ships have an autopilot, which automatically keeps the vessel on a predetermined course. On such ships, the IBM Bridge System is also attached to the steering engines. By comparing the course shown by the gyrocompass with the designated course, the system can command the rudder movement and instruct the steering engines to keep the ship on course.

Much of this has been explained on the return to Ostend by Captain Bedert and Frits Sorensen of the IBM Maritime Systems Center (Milan). Sorensen, who is systems engineering support manager, is a captain who served 13 years in the Danish merchant marine. He believes that working with a product related to his own background is “nothing short of marvelous,” and there is between him and Captain Bedert an easy-going camaraderie. Like other members of the Milan center’s eight-nationality staff, Sorensen gives demonstrations aboard the *Prins Philippe* and also helps salesmen make presentations to European ship owners.

Bedert and Sorensen may sometimes reminisce and talk of the sea, but when their conversation turns to the IBM Bridge System, it usually fastens on its potential. “We are not greedy,” says the *Prins Philippe* captain, smiling, “but we are excited about other things the system might do.” In July, Sorensen happily told him of a new application: stress and stability analysis. This will help determine the sequence of loading and unloading cargo so that a

vessel’s stability and hull forces are within acceptable limits.

For Captain Bedert and his crew this has been a placid crossing, from the moment the *Prins Philippe* slid past Dover’s famed cliffs and out into open water. There has been no fog, only mildly ruffled water, and a few dustings of rain shrugged off by the ship’s windshield wipers.

Now the ship noses into the harbor of Ostend and glides by the sedate façades of its waterfront buildings. In a few moments it will dock, and people and lorries will stream from it. Even though the sky is heavy with clouds, the moment has a certain festiveness. It is, after all, a safe arrival; and no matter what is new in seafaring, this will never be taken for granted. ■

A sleeve with a past

The tides of history run deep in the English Channel, which is known in French as *La Manche* (The Sleeve). It has been the route used by invaders of Britain from Continental Europe, the most notable being William the Conqueror, who crossed from Normandy to Hastings in 1066. Its naval dockyards helped stiffen the British defense in both World Wars. In 1940 it was the scene of the massive Dunkerque evacuation, and four years later, an Allied fleet sailed it for the invasion of Normandy.

The Channel is a narrow sea separating the southern coast of England from the northern coast of France. It is between 22 and 150 miles wide, and its depth ranges from 20 fathoms near Dover to 60 fathoms south of Land’s End. Each day some 400 ships sail through the Dover Strait (its narrowest section). Many of them are ferries sailing to and from Dunkerque, Calais, Boulogne, Ostend, Zeebrugge, Dover, and Folkestone.

*One knot equals one nautical mile per hour; and one nautical mile is 6,080 feet.

DOUBLE TR

INFLATION AND UNE

FEDERAL RESERVE

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WASHINGTON
ONE DOLLAR

DOUBLE EMPLOYMENT

Until 1965, inflation was an alien word to most Americans. Except for a brief splash of it after World War II, and again during the Korean War, prices had remained remarkably steady for almost a generation—inching up much of that period at the rate of only 1.5 percent a year. Just enough to make it easier to pay off that mortgage as the productivity and real incomes of most workers rose. In pre-Vietnam America, the American dream was working well.

A warning bell sounded in 1966 when inflation doubled to 3 percent. Again, in 1969, when it redoubled and hit 6 percent. But the fire storm came in 1974 when inflation shot up to a frightening 12 percent a year and interest rates soared to their highest level since the Civil War.

By now it had become the number one worry of most wage earners as more and more in the paycheck continued to buy less and less. In ten years, the cost of living climbed 71 percent. Real income declined during most of 1973 and 1974 for the first time since the Great Depression, meaning that for most Americans the standard of living was no longer getting better, but worse.

Business, like the consumer, was caught in the same bind. In some industries profits appeared to soar. But, for most, they were phony, inflated profits. In real dollars, they were off substantially from 1968 levels, and business found itself hard-pressed to pay the rising costs of new product development, new plants and equipment to replace what had become obsolete.

The economy was in trouble. Consumers were paying more, buying less. Demand slackened, sales fell, production lines shut down. And

workers were laid off. Trouble had become double trouble with both inflation *and* unemployment. By the spring of 1975, some eight-and-one-half million Americans were jobless, resulting in the nation's highest rate of unemployment since the 1930s.

In earlier postwar recessions, Keynesian economics had seemed to turn the trick. As unemployment rose, the government would prime the pump by spending more, sometimes taxing less, to help create purchasing power and revive demand. Industry could then tool up to supply that demand and put the jobless back to work.

But inflation had changed the rules of the game and it presented us with a cruel dilemma. Prime the pump to put the jobless back to work and you run the risk of more inflation. Hold down government spending to contain inflation, and many of the jobless remain jobless. The critical question—how to revive the economy and restrain inflation—and it's almost like raising both ends of a seesaw at one and the same time.

Economists, predictably, are in disagreement as to both cause and cure. To help readers understand the dilemma and form their own conclusions, *Think* called on Stanford University Economist Ezra Solomon, a one-time member of the President's Council of Economic Advisers, and author of a timely book, *The Anxious Economy*. Some of his views are summarized in the question-and-answer interview which follows.

Professor Solomon's comments, it is safe to say, won't satisfy everyone. But they do shed some light on a subject ordinarily discussed with more heat than understanding.

ANATOMY OF THE DILEMMA

What's the central problem in today's muddled economy?

"Inflation," argues Stanford Economist Ezra Solomon. "It's causing both the recession and unemployment and until it's licked, we'll remain in trouble."

What's the central problem?

Inflation—and it's important to recognize that fact. It is the cause of both the recession and unemployment. So, we can't correct either the recession or unemployment until we lick inflation. It's as fundamental as that.

backs in defense spending or by reductions in business outlays for plant, equipment, or inventory. This recession is different in that it began, as I said before, when inflation eroded the purchasing power of consumers.

But, surely, full employment is a worthwhile goal . . .

It most certainly is—but you've got to know how to achieve it. You can't create full employment by creating inflation. Because inflation, as we've found out, can bring on recession and unemployment.

What is inflation? How do you define it?

How has inflation caused this recession?

Prices have gone up faster than spendable income. With less money to spend, people have cut back on their purchases. So manufacturers cut back on their production. Workers are laid off, and this means purchasing power declines even more.

Well, let's start with the classical definition of inflation—*too much money chasing too few goods*. But that's too easy. The real question is: Why is there too much money in the first place?

Some people blame Keynesian economics for the government spending that triggered inflation during the mid-1960s . . .

Does this mean that today's inflation and recession can be explained solely in terms of money supply?

But if demand has been falling, why do prices keep going up?

Usually, when economic activity falls off, the rate of inflation slows down. This time prices kept going up because inflation was still at work. As long as business has to pay more for raw materials and labor, the price of its finished products will continue to rise, even at the risk of lost sales.

What about interest rates—why do they go up, instead of down?

That's another switch. Usually, during a recession, when business falls off, credit becomes more available and interest rates decline. But this time the supply of money was deliberately restricted, especially during mid-1974. Why? Because the Federal Reserve Board wanted to check the growth of the money supply to break the back of inflation. This is what we call monetary policy. Let money get too tight, and you can go from recession to depression. Let it get too easy, and you bring on more inflation. All of our previous postwar recessions began in the nonconsumer sector of the economy, triggered for the most part by cut-

No. It's a good deal more tangled than that. Go back to the period between 1965 and 1969 when inflation climbed from 1.5 to 5.4 percent. Two forces were at work. Monetary policy, for one; credit was made easy. But with deficit spending by the government, and full production and employment, we also created an imbalance between supply and demand. People had money to spend for more goods than we were able to produce.

But that doesn't explain what happened after 1972, when inflation, having declined to 3.3 percent, suddenly shot up to 12 percent in 1974.

This was caused by a number of things which are not likely to happen again, at least, not in that combination—such things as devaluation of the dollar, massive crop failures, and, to top things off, the oil embargo.

But to search out the root causes for some of the inflation we are experiencing today, we must go all the way to the 1930s, when one out of every four persons in the work force was unemployed. That was a traumatic experience. We resolved never to let it happen again. And so, the nation became wedded to the ideal of full employment.

What most people remember Keynes for was his idea, startling at the time, that in bad times the government could run a budget deficit to expand the economy. That is, it should spend more money and/or cut taxes to put more cash into the hands of consumers. *But they forget he also said that in good times the government should run a budget surplus to brake the economy.* That is, it should reduce spending and/or raise taxes to reduce the money supply and thereby cut back on demand.

What happened, of course, is that, for the past 10 years, the government, with its dedication to full employment, almost *always* has run a deficit budget, and Keynes has been unjustly blamed for that.

What's wrong with a budget deficit?

There's nothing inherently right or wrong about budget deficits or surpluses. The real question is: How much demand do you want to put into the economy? If the government spends money, it creates purchasing power. If it pays for that expenditure by raising taxes, then it removes some of that purchasing power. But if it doesn't raise taxes, then it must pay for that expenditure by borrowing money. This extra demand gets financed essentially by the creation of additional money by the Federal Reserve System, and that's a powerful

expansionary force. However, there are times when this expansion creates additional inflationary pressures.

Why do you think that our present troubles really began in 1965?

Although the United States ran budget deficits through most of the postwar period, there was generally some slack in the economy. Business could always increase output to meet demand.

If you look at the figures you'll see we had inflation of about 1.5 percent per year from 1950 through 1965, which is virtually no inflation. Real income rose throughout that period.

Beginning in 1965, however, things were different. The economy was operating at full capacity. We had full employment. We had a nice boom go-

ing. Then the trouble began. The inflation rate doubled to 3 percent a year by 1966 and redoubled to 6 percent by early 1969. This doubling and redoubling occurred because, on top of full employment, we embarked on two wars at the same time—one in Vietnam and one at home against poverty—without increasing taxes to pay for either! Please understand—I'm not arguing for or against either of those wars. What I am saying is that the deficit financing of them was predictably inflationary.

Are you arguing against budget deficits?

No. I'm against running budget deficits in a period of full or nearly full employment. By doing just that from 1965 to 1968 we created excess demand that our plants and factories

couldn't satisfy. Full employment deficits, as they are called, are powerful inflationary forces. Rather than borrowing to pay for rising expenditures, we should have raised taxes to take some steam out of the economy.

How does a deficit under full employment cause inflation?

It generates what we call "demand-pull" inflation. This grows from the imbalance between supply and demand. Too few goods and commodities; too many customers with the means to buy them. Demand-pull is the underlying cause of inflation.

But what about "cost-push" inflation? Doesn't that also play a role?

Once excess demand pushes up prices, then cost-push becomes a factor, too. As the cost of living goes up, workers want raises. And when business grants raises over and above productivity increases, then it must also raise prices to offset the wage increases it has to pay. At that point, inflation begins to have a life of its own.

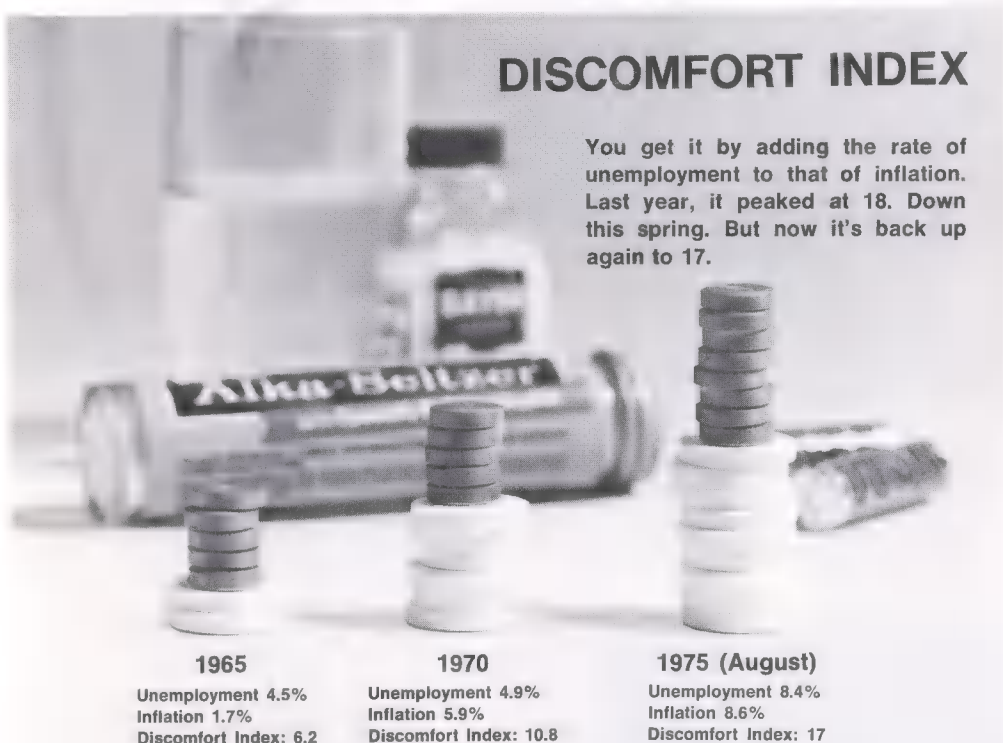
Why couldn't this be stopped with wage and price controls?

A simple freeze is easy to administer, but if you want a system of controls to work over an extended period, you've got to go the whole way: rationing, allocation of resources, the works. Do that and you'll get stable prices as we did during World War II. But obviously, no one wants to do that sort of thing in peacetime.

Don't price controls also inevitably suppress supply?

Sure they do. All you do is suppress supply. You don't control prices. And when you suppress supply you're doing exactly what you do when you create excessive demand. Both drive prices upward.

Natural gas is a good example. With controls, the many producers in the industry have had no incentive to explore and increase capacity. Meanwhile, cheap gas prices have led to increased use. The upshot, of course, is that now consumers have to pay the higher cost of oil, which is much higher than uncontrolled natural gas would have been.



Source: U.S. Bureau of Labor Statistics. Inflation is represented by the change in the Consumer Price Index from the previous year. For August 1975, the inflation rate was calculated on an annual basis from August 1974.

THE FEVER SPREADS ABROAD

With inflation in the U.S., lower-priced overseas goods poured into American markets. Dollars flooded the money markets abroad. Result: worldwide monetary expansion—and inflation.

The sudden surge in inflation between 1972 and 1974 cannot be explained solely in terms of what was happening in the United States. Here, Professor Solomon goes into the worldwide ramifications of the disorder and concludes with what he believes are the principal lessons to be drawn from the fix we find ourselves in.

We've talked about how inflation got going inside the United States. Weren't there also events on the international scene that helped to fire inflation?

Starting in 1972, a number of unprecedented events took place that can't be entirely explained by full employment deficits. And perhaps the main culprit was the 1946 Bretton Woods agreement of fixed exchange rates between currencies. All currencies, by that agreement, were pegged to the American dollar. The Japanese yen, for example, was fixed at 360 yen to the dollar, and the Japanese Government was obliged to maintain that external par value within a narrow band of plus or minus 1 percent. The central bank in Japan maintained par value either by buying yen with dollars or buying dollars with yen. And, of course, all the other nations did the same with marks, guilders, pounds, and so forth. It was a simple supply and demand situation, and the objective was for each nation to maintain the equilibrium between dollars and its own currency.

How did that lead to worldwide inflation?

Fixed exchange rates worked well as long as our own economy behaved properly. For 75 years we had consistently imported less than we exported. But the 1965-'70 inflation changed all that. As our own products rose in price, foreign nations began to invade the U.S. market with lower priced goods and they began to take away

other export markets from us. So instead of being an exporter of cars, we became the world's biggest importer of cars. Instead of an exporter of steel, we became the world's biggest importer of steel. From an exporter of petroleum, we became the biggest importer of petroleum. When we do something, we really do it big!

Now, when imports start to exceed exports, dollars flow out of the country. At the same time we were fighting a war and spending a lot of dollars overseas on that. The net result was that we flooded the foreign money markets with dollars.

And that upset the equilibrium you spoke about?

It led to a worldwide monetary expansion. The Japanese Government had to buy dollars with yen to correct the imbalance. They did so to prop up the exchange value of the dollar at the level established at Bretton Woods. The Japanese central bank kept on creating yen to buy dollars, and this pushed more yen into circulation in Japan. The increase in the money supply generated purchasing power, excess demand, and inflation in Japan. And, of course, the same thing was happening in Germany, the Netherlands, France, and a half-dozen other countries. *Thus, the U.S. deficit, which started with our own fiscal and monetary policy, became the engine of inflation throughout the world.*

In other words, prices started to go up everywhere?

They sure did. The perpetuation of a system of fixed exchange rates and an overvalued dollar created a tremendous amount of worldwide purchasing power. And that helped trigger an industrial boom the likes of which the world had never seen. In Japan, for example, industrial production rose 25 percent between the

third quarter of 1972 and the first quarter of 1973. In previous years it had risen only 9.5 percent. In many other countries, including West Germany, the growth rate of industrial production also trebled. That put tremendous pressure on worldwide raw materials and commodities, already in short supply. A great deal of stockpiling took place on the part of both countries and companies. Prices shot upward everywhere, including the U.S.

Why did the other countries prop up the dollar? Why didn't they let it sink in relation to their own currency?

Well, they could have. But that would have amounted to a *de facto* devaluation of the dollar, and this would have made their own exports more expensive in the U.S. Japan and West Germany, among others, really struggled with this problem. If they let the dollar sink, the value of their own currency would rise not only against the dollar, but against other currencies as well. They would lose large segments of their export markets.

Eventually, though, we were forced to devalue the dollar . . .

We devaluated twice, once in December 1971 and again in February 1973. Ironically, the devaluation itself, although it was necessary, also put upward pressure on U.S. prices. We had to pay more in dollars for imported commodities and raw materials.

And so we dumped the Bretton Woods agreement for floating rates?

Yes. Currencies now rise and fall against each other like water seeking its own level. This, of course, will help the U.S.—as well as most other countries—as we return to economic health. If we lick inflation, the demand for our products abroad will increase,

and that will boost production and employment here at home. So you see, it all comes back again to inflation.

What about food shortages—how do they fit in?

In 1972 we had worldwide crop failures. Worldwide demand for food normally grows about 4 percent per year. Suddenly world food production fell off 4 percent. The U.S. was the only major residual supplier of grains, and the demand for that grain, backed by all the purchasing power that had been created around the world, forced grain prices sky high. Prices of U.S. farm products shot up 46 percent, grain 60 percent, and vegetable oils 97 percent during 1973.

Did the oil embargo of October 1973 hurt as much as people think?

Absolutely. It had a double-whammy effect. First, the quadrupling of oil prices spurred inflation, since the production of virtually all goods and services is dependent upon energy. The rise in the price of oil, along with other raw materials, was a major factor in the subsequent *cost-push* inflation that plagued us all through 1974. Second, the cut-off in supply hastened and sharpened the decline in economic activity, already under way as the result of the erosion of purchasing power. In addition, it had a disastrous impact on the automobile industry, which is so central to our economy. The embargo fueled both inflation and recession.

In your book, *The Anxious Economy*, you say there's a "narrow passage" out of our dilemma. Can we navigate that narrow passage between inflation and recession?

It won't be easy. But I believe we can reduce inflation and unemployment simultaneously. As the result of our tight money policy, the inflation rate has declined substantially despite some resurgence this summer. Purchasing power is on the rise again. We don't need, and we're not likely to see, a general fall in prices. What we do need, and hopefully will continue to see, is a rise in real income.

What helps, of course, is the fact that commodity inflation tends to run its course. And business has reversed its policy of stockpiling copper, fertilizer, and everything else under the sun. Meanwhile all those phony, in-



OVERVALUED DOLLAR

flated-dollar profits are coming to an end, and so are the taxes on those phony profits. As a result, fiscal policy has automatically become more stimulative by taking a smaller tax bite.

In addition, we have had a cut in tax rates—a good move at the time. And if the economy doesn't recover, I would think it wise for the government to extend that tax cut into 1976.

Now you might say this is inflationary because it creates demand. But there's so much slack in the economy today that the bulk of new demand will result in a rise in output and employment rather than a rise in prices.

Do you feel that we're entering a new economic era?

This is definitely a watershed, a period of transition. Today, the major economies of the world are highly interdependent. They are more nearly equal in size and they go up and down together. While political considerations will always be important, foreign policy is going to have to give more ground to economic considerations. For too long, international economic policy was the stepchild of foreign policy and the Cold War. We put up with all kinds of trading disadvantages

to support our allies. We refused to trade with Russia and China and placed an embargo on Cuba. All those things contributed to the economic situation we find ourselves in today.

What's the principal lesson we can draw from this fix we're in?

In a nutshell—we just cannot create lasting full employment by overstimulating demand through fiscal and monetary policy while suppressing supply by denying business the incentives it must have for investment. When we do that all we get is inflation and unemployment. To maintain full employment, there must be gains in productivity—in real income and purchasing power.

In the long pull, what counts most are gains in productivity. They are certainly the best, and perhaps the only way to increase real income. For when you raise wages faster than productivity, it's an open invitation to inflation. Reverse the order, and you produce an increase in real income.

But those productivity gains can come only from reinvested profits. So one way to fight inflation is to allow business to keep more profit for research and development, for capital investment in plant and tools, and for worker training.

But at the same time, let's not overlook the international complications of this present situation. The high price of oil. The drift toward commodity cartels. The need of the undeveloped nations. But even though it's not going to be easy, I feel we can find a way through those thickets. And when we do we shall be in a better position than ever to pursue a sober policy of sustainable growth. ■

Burma-born Ezra Solomon is Dean Witter Professor of Finance at the Stanford Graduate School of Business, and has served as a member of the President's Council of Economic Advisers. He has been a visiting professor in 12 countries and also serves as a consulting economist to government and industry in the U.S. and abroad. He was interviewed for this article by freelance journalist Richard Bode.

Next issue

LIFEBLOOD OF THE ECONOMY Profits and Capital Investment

With former chief economic adviser to the President, Herbert Stein.
Part III of "Business and how it works."





Maria Zanichelli celebrated her birthday in Washington, D.C. Françoise Vittoz bought an M.I.T. T-shirt. Cornelia Soederqvist decided that San Francisco was her "favorite town in the whole world." And Petronella Leijnse— even before she boarded the plane for home, she was "homesick for California." These young women, from Italy, Switzerland, Sweden, and the Netherlands, respectively, were among 16 undergraduate women students from leading universities and technical schools in eight European countries who came to the United States this summer to work at IBM scientific and research centers.

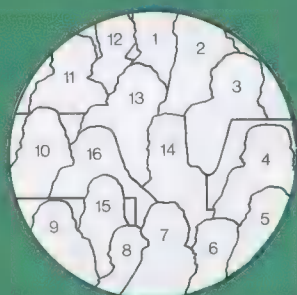
The program that brought them here was sponsored by the IBM Europe/Middle East/Africa Corporation in conjunction with the United Nations' celebration of International Women's Year. Its aim was to encourage European women to consider technical careers in data processing.

Selected for academic excellence in certain fields of study, the students—most of whom are math and science majors—gathered at IBM Europe's Paris Headquarters in June and heard E/ME/A Chairman Jacques Maisonrouge say that the program would help them to form their own opinions on large business and its operations.


They took off for IBM locations in California, Massachusetts, New York, and Pennsylvania, where they did everything from programming to making sales presentations. And at a final meeting before a tour of the U.N., the consensus seemed to be that IBM was a more personal and challenging environment than many of them had imagined.

Here for 10 weeks, the students traveled as much as possible—and, among other things, got some impressions of Americans that may have been surprising.

"Really," said a young woman from Sweden's Linköping University, "the people here are wonderfully normal."



- | | |
|---------------------------------------|---|
| 1. Gunilla Borgefors, Sweden | 9. Petronella Leijnse, the Netherlands |
| 2. Michèle Christakis, France | 10. Christel Schrameyer, Germany |
| 3. Ines Margaria, Italy | 11. Edda Keszler, Germany |
| 4. Kristien De Bruyn, Belgium | 12. Maria Zanichelli, Italy |
| 5. Angela Hey, United Kingdom | 13. Françoise Vittoz, Switzerland |
| 6. Antonia Strickland, United Kingdom | 14. Martine Canape, France |
| 7. Gerda Feldmann, Switzerland | 15. Geneviève Lontie, Belgium |
| 8. Cornelia Soederqvist, Sweden | 16. Constance Kleijnen, the Netherlands |



FROM SAGE TO SPACE TO SONAR

by Richard Bode

Most of the 11,000 people who work for the Federal Systems Division are convinced there's no other division in the company quite like theirs.

To a large extent they're right. For example:

- FSD is an integrated division. It develops, tests, manufactures, and sells its own products.
- It designs and builds prod-

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TWENTY YEARS WITH THE FEDERAL SYSTEMS

ucts, from one-of-a-kind to hundreds, and develops the software for them.

- It does business primarily with the Federal Government—although lately it has become increasingly involved with state and local governments and public authorities on new kinds of projects.

- On any particular project, FSD may be either a prime contractor to a government agency or a subcontractor to another company.

- It must abide by stringent Federal regulations, which means a steady stream of audits and reviews.

- It often tackles highly visible, technically complex projects.

Even more important than how it is organized or how it responds to the pressures of its business world, FSD's most salient characteristic lies in its link to history since the end of World War II. More than any other IBM division, FSD has participated in the distinctive

events that have shaped the 20 years since it came into being:

—During the Cold War era of the 1950s, for example, it helped the Department of Defense develop long-range strategic military systems—both offensive and defensive—to detect and deter enemy attacks.

—During the space-age 1960s, as a prime contractor to the National Aeronautics and Space Administration (NASA), FSD people provided launch support, as well as helping develop the ground-based tracking network, and integrating the on-board instruments that guided the Saturn booster into earth orbit and propelled 27 astronauts toward lunar rendezvous.

—During the 1960s, as brush-fire wars flared, greater emphasis was placed on short-range tactical weapons systems. FSD began to produce avionic systems—rugged and reliable computers packed aboard jet fighters and short-range bombers for guidance, navigation, and weapons control.

—Since 1970, as the U.S. Navy modernized its underseas deterrent force to counterbalance the growth of the Soviet submarine fleet, FSD has been on the leading edge of ocean surveillance, sonar, and anti-submarine warfare systems, especially for nuclear submarines.

"Although FSD's business will maintain its predominantly Defense character, we are not limiting our focus," says James A. Bitonti, FSD vice president for operations. "With increased national emphasis on the problems of our people and our cities, we are determining if there are meaningful ways as a division to participate in the solutions of these problems in

such areas as medicine, energy, and transportation."

How is FSD adapting its resources to new opportunities?

Last year, the division reorganized to make better use of its resources and to achieve a more cost-competitive posture by reducing indirect expenses.

"We wanted to have the ability to establish priorities quickly as new programs of national interest present themselves," says Bitonti. "Also we structured the division's operating locations to balance their hardware and software capabilities. This was done in order to enhance FSD's ability to compete for systems business."

FSD carries out its diverse activities in three distinct groups, each responsible for a portion of the division's total business.

- One group, located in Owego, N.Y., has a double-pronged responsibility: It produces avionic systems and is the major manufacturing arm for the division. "There's no special relationship between avionics and manufacturing," says J. Kenneth Driessen, FSD vice president in charge of avionic systems. "That just happens to be the most convenient way for us to organize."

- Another group, located in Gaithersburg, and headed by Joseph M. Fox, FSD vice president, has responsibility for space and civil projects. The work for NASA at Cape Canaveral, Houston, and Huntsville, comes under Fox's purview, as does the work for the Federal Aviation Administration in Atlantic City.

- A third group, located in Manassas, Va., and headed by Albert F. Zettlemoyer, FSD vice president, has responsibility for

shipboard and defense systems, including facilities in Madison, N.J., and Westlake, Calif.

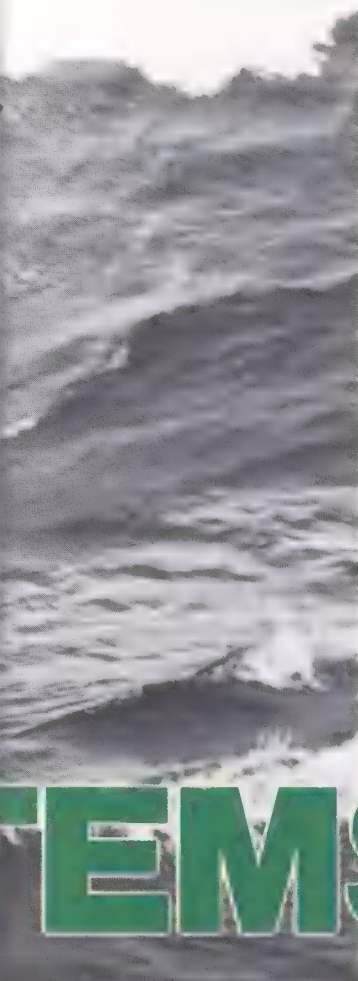
Because of its involvement in rapidly expanding Navy projects, Manassas is the fastest growing of the division's locations in sales and revenues. Since the Navy has a substantial part of the defense budget, and its programs have strong Congressional support, this has given FSD diversification; previously its business base lay in the Air Force and NASA.

But growth in revenues and profits is not the sole objective of FSD. Its goals are best expressed in its three-part mission statement: to serve the national interest; to be a precursor in technology; to earn a reasonable profit.

"What we attempt to do," explains John B. Jackson, IBM vice president and FSD president, "is identify Federal programs of national importance. Then, within those programs, we try to see where FSD can make a unique contribution because of its technical and management competence. We look for demanding programs, ones which can fully utilize our capabilities."

Jack O'Malley, FSD vice president for marketing, adds: "Only those companies which are extremely cost-conscious and offer a balanced technical approach, combining state of the art thinking with new technology, can be successful government contractors."

How does the division control its costs? Largely by giving as much responsibility as possible to its managers—down to the second and first line. The division itself is a single profit center, but managers are measured by their



SYSTEMS DIVISION

ability—among other things—to meet cost and profit objectives on projects under their direct control.

Speaking about his own operation in Owego, Driessen says: "I'm given a job to do. I have to find ways within my business area to control costs and, at the same time, support the division in attaining its profit objectives."

From its founding in 1955,

when it was called the Military Products Division (it was renamed FSD in 1959), it has been a precursor of real-time and remote-sensing systems, of the integration of the computer with non-data processing systems, of file management and data base management, of structured programming techniques, and of miniaturization.

"We can't say that there has been a direct transfer of an en-

tire technology from FSD to another division," says Larry Sarahan, FSD vice president, technology. "But we can say that the mere fact that we did certain things successfully gave others in the company a lot of confidence to pursue them on their own."

In short, FSD has caused a lot of things to happen inside IBM that otherwise might never have happened at all. □

which would operate in real time and perform a navigation and bombing function.

The second program, started in 1952, was the creation of the SAGE (Semi-Automatic Ground Environment) air defense system. Nothing like it had ever been attempted. Before SAGE, air defense was based on individual operators monitoring single radar scopes and reporting by phone what they saw. With SAGE, the Pentagon planned a huge interconnected network of digital computers fed by ground-based radar, picket ships, early warning aircraft, and even ground observers. The digital computers would process this data and pictorially display the battle situation—if, indeed, an attack were imminent—for human controllers.

Patently, the technologies demanded for both these programs were well ahead of their time. Here was the Pentagon talking in terms of real-time, sensor-based computers—when first-generation technology was barely off the drawing boards. It wasn't until 1952 that IBM introduced the 701, its first mass-produced, large-scale, stored-program computer.

And yet the Pentagon's requests were not entirely unexpected. IBM's electromechanical competence was already well known. During World War II, the company had participated in no less than 38 separate ordnance projects. Among other things, it had developed an automatic gunfeed mechanism for aircraft cannon, produced the Browning automatic rifle, and made bombsighting instruments for the B-29 Superfortress.

But even if the requests

BEGINNING OF REAL TIME

In March 1946, Sir Winston Churchill, speaking at Westminster College in Missouri, put his rhetorical imprint on the postwar age when he declared: "From Stettin on the Baltic to Trieste on the Adriatic, an *iron curtain* has descended across the Continent."

It's almost impossible three decades later to fully recapture the Cold War fever that followed hard upon those prophetic words. Perhaps Dean Acheson summed up the national mood when, as Secretary of State under President Truman, he said: "There can be no greater disagreement than when somebody wants to eliminate your existence altogether."

In 1947, Soviet-backed elements seized power in Poland and in Czechoslovakia in 1948.

In June 1948, Soviet troops had blockaded access to Berlin, and a British-American airlift supplied the city for 321 days. By August 1949, Russia had exploded her first atomic bomb and boasted that she was building a bomber fleet that



Winston Churchill

could deliver a nuclear payload on American cities across the North Pole.

Russia never built those bombers. Instead, she developed powerful rockets and ultimately stunned the world with the totally unexpected launching of Sputnik I, the first man-made satellite, on October 4, 1957.

Meanwhile, by September 1949, the Chinese Communists had completed their conquest of China. Less than a year later, the United Nations "po-

lice action" in Korea had turned into a full-fledged shooting war.

Against this rapid succession of postwar events, the Department of Defense began to take vigorous steps to protect the nation against air attack. At that time, the Pentagon approached IBM and asked it to participate as a prime contractor in two programs of strategic national importance.

The first program, initiated in 1951, was the B-52 long-range bomber, the mainstay of the Strategic Air Command and a prime force in its ability to retaliate in the event of an enemy attack. To be effective, the strategic bomber had to be able to fly long distances, reach a precise destination, and strike its target. What the Pentagon wanted IBM to do was to product engineer, improve and produce a computer which was under advanced development through the Air Force's Wright Patterson Laboratories. Additionally, IBM was asked to integrate the overall computer-augmented system



SAGE: 113 TONS, 58,000 TUBES

SAGE, the first computer-based system of air defense, was a vast and unprecedented undertaking. It was connected with a series of radar "fences" strung across the North American continent. The northernmost was the DEW line, which ran all the way from Alaska in the west, across northern Canada, to Iceland in the east. These fences, as well as hundreds of radar sites scattered across the U.S., were linked by some 1.5 million miles of communications circuits to computers housed in 19 direction and combat centers—one in Ottawa, the rest across the U.S. The IBM-supplied central computers, large vacuum-tube machines called the AN/FSQ-7, were designed jointly by the Poughkeepsie laboratory and M.I.T.'s Lincoln Laboratory. The 113-ton machines—each with 58,000 vacuum tubes—were built at the Kingston plant. The IBM systems were installed at operational sites between 1958 and 1963. In the mid-Sixties, the Air Defense Command, which operated SAGE, had become a 100,000-man operation with \$8-billion of equipment and a \$1-billion annual budget. SAGE was gradually supplanted. Besides its military importance, it marked a giant step toward today's real-time computer networks.

were not altogether a surprise, their consequences were largely unforeseen. The innovations spawned by those two programs would span more than two decades and push the company into areas that went well beyond electromechanical devices.

The implications of the SAGE and the B-52 programs can best be understood if the technologies that flowed from each are traced one at a time.

For IBM, SAGE began in an old red-brick building in Poughkeepsie that once housed a necktie plant. Despite the inauspicious surroundings, the project turned out to be one of transcendent importance, because it forced the company into an accelerated learning curve. SAGE was IBM's first venture into a massive real-time system: that is, a system in which there is virtually no lapsed time between receiving and processing data from a remote, ongoing event.

* * *

While SAGE was under way, in July 1956, the Government selected IBM to develop a high-speed computer facility to calculate the orbit of satellites to be launched during the 1957-1958 International Geophysical Year (IGY). A small group of IBM technical people set up the Space Computing Center in a storefront building at 615 Pennsylvania Avenue, Washington, D.C. The center was in operation when Sputnik I was launched. From that historic moment, it began to predict the paths of most space probes from the United States and the Soviet Union. The IBM staff of mathematicians and programmers, working with NASA people, perfected a computing system that

subsequently enabled NASA scientists to obtain the most definitive orbits ever calculated.

Such calculations were critical during IGY. Scientists recognized that experiments conducted by unmanned laboratories would be valueless unless they could be correlated with the position of the satellite as it raced through space at 18,000 miles per hour.

The Space Computing Center was equipped with an IBM 704, a primitive computer by today's standard. But that IBM 704 performed yeoman scientific work. When Vanguard I was launched on March 17, 1958, for example, its orbital calculations supported the theory that the earth is pear-shaped, narrow in the Northern and broad in the Southern Hemisphere. And when Explorer VI was launched on August 7, 1959, the orbital calculations made by NASA scientists Dr. John O'Keefe and Ann Eckles showed minor variations from the satellite's projected course. This information turned out to be especially important to a physicist from the University of Iowa, named Dr. James Van Allen. From data sent back to earth, he measured and mapped two distinct zones of intense radiation trapped in the earth's magnetic fields—zones well-known today as Van Allen Radiation Belts.

Drawing on SAGE and Vanguard, FSD by the early 1960s had acquired the experience to develop ground-based command and control centers for NASA for Project Mercury (1961-63), which put a manned spacecraft into orbit; for Project Gemini (1964-66), the two-man orbiting vehicle; and for the Apollo Program (1966-70), which put man on

the moon; and finally Skylab and the recent Apollo/Soyuz hookup.

For Project Mercury, FSD combined what it had learned from SAGE and Vanguard to help develop the Goddard Space Flight Center in Maryland, which collected radar data in real time from a worldwide tracking network. Goddard became the information link with the spacecraft; it sent instructions to the vehicle and processed data that streamed back to ground control as soon as the booster rocket lifted off the launch pad.

After Mercury and the first Gemini flight, the task of monitoring manned space flights switched to the Real-Time Computer Complex (RTCC) at the Johnson Space Flight Center, Houston. The work of the RTCC, also developed by FSD, can only be described as massive: It controlled 9 Gemini and 15 manned Apollo flights. More than 10 billion instructions alone were executed in carrying out the Apollo 11 mission—the first moon landing on July 20, 1969.

During that first moon shot, the RTCC was responsible—from moments after lift-off through rendezvous—for correction in the lunar orbit, for command of the lunar module, and for the return trajectory through final splashdown. During the mission, it simulated this reentry trajectory 400 times before the homeward voyage began. Special programs helped orient the vehicle for space experiments; still others controlled the transmission of data from experimental packages left on the moon.

As space technology advanced, however, SAGE itself

became outmoded. The first part of that acronym—Semi-Automatic — explains why. FSD's real-time command and control experience in the space program contributed to the division's selection as prime software contributor for a more sophisticated antiballistic missile system called Safeguard. This system combines the SAGE function of early warning with the defensive capability of the Spartan and Sprint missiles.

One of the activities within FSD today is determining how to channel its command and control know-how into Federal civil projects. The division is engaged in about two dozen such programs, some of them tentative, few of them large, some of them promising.

FSD has applied its ground-based command and control experience most directly with the Federal Aviation Administration. In August, the division completed an entirely new en route air traffic control system for the agency. Twenty control centers spaced about the country monitor all commercial domestic aircraft once they fly beyond the jurisdiction of airport control towers.

FSD's real-time capabilities have led it to develop software for process control applications. Its ability to interpret facts about earth from infrared photographs transmitted from space have led it into far-reaching resource-management studies for the Bureau of Land Management. Its ability to organize vast amounts of data have led it into a project for the creation of an orderly land development plan for a fast-growing county in Florida. Its command and control capabilities have enabled it to put together the Special Po-

lice Radio Inquiry Network (SPRINT), which allows New York City's police department to respond rapidly to emergency calls.

To develop the computer programs for these diverse applications, FSD draws on a programming expertise that became evident during Project Mercury. Over the years, the division's highly skilled programmers have propelled it into a leadership role in the software field. Many current projects rely heavily on the concepts of structured programming and chief programmer teams developed by Dr. Harlan

Mills, IBM Fellow and manager of advanced technology in FSD's civil and space group.

"Because FSD's projects are usually one-of-a-kind, they require programs that are equally as unique," says Dr. Mills. "The division has built its reputation as a software leader through sound performance on some very sophisticated and demanding assignments."

Says Joseph M. Fox, FSD vice president for civil and space programs: "We're pushing hard in many areas, but we still have many difficulties to overcome, especially in marketing. We don't find the same centralized buying authority with civil projects that we do with, say, space. The funding decision is usually made in Washington, but the problems we're asked to solve usually exist far away at the state or local level."

Despite these obstacles, however, Fox believes that the lessons learned in defense and space programs can and should be applied to all those other earth-bound problems that still beset mankind. □

FROM AIRCRAFT

The Federal Systems Division was literally forged from the SAGE and B-52 programs in the early 1950s. Both were based on commercial technology. Both called for the creation of special-purpose hardware. Yet in two respects, they were mirror images of each other.

SAGE and the technology that flowed from it was ground-based. The B-52 program led to the development of digital computers aboard aircraft at first, and spacecraft later on.

But whether developed for planes or satellites, these computers have one thing in common: They are critical to guidance and navigation. As such, they must function flawlessly for long periods under the most potentially adverse environmental circumstances imaginable.

Monroe M. Dickinson, manager of product technology development in Owego, says the FSD avionics systems for aircraft

must function on the average for 1,500 hours (about 63 days) continuously without failure. In actual practice, FSD computers placed in satellites and aboard spacecraft have functioned far longer than that. The computer system on board Skylab, for example, recorded an impressive 6,504 hours of continuous operation.

To achieve that degree of reliability, systems must withstand extraordinary vibration and temperature extremes. And they must be compact—smaller than a bread box—to fit into restricted spaces. Size and reliability constraints are the main reason why FSD explored and applied technologies that, when implemented, were ahead of their time: for example, magnetic core memories, magnetic drums with floating heads, semiconductor circuits, large-scale integration, and—perhaps most important of all—the integration of the com-



*FSD President
John B. Jackson*

FT TO SPACE

puter with other systems.

A decade ago, the division developed its System/4 Pi computer, which has often been likened in concept to the System/360. Explains FSD President John Jackson: "4 Pi isn't a family of computers like System/360. But it is based on a common technology which gives us great flexibility in adapting components to specific applications." Before becoming FSD president, Jackson helped bring 4 Pi into being. Today, 4 Pi is widely used in U.S. strategic and tactical aircraft. A System/4 Pi is the central processor for all of the complex command and control functions of the Airborne Warning and Control System known as AWACS.

But FSD engineers had to blaze an arduous development trail to get to today's sophisticated onboard computers.

In the 1950s, IBM designed an onboard digital computer

called DINABOC (Digital Navigational Bombing Computer). One of its attributes was an exceedingly lightweight drum with air-floated heads for the storage and retrieval of information. To this day, drum memory devices are used as storage components in many of FSD's computer systems because of their ruggedness, reliability, and capacity. A refined version of DINABOC became the guidance computer for the aborted B-70 bomber program and the Titan ICBM.

By that time, FSD was beginning its space program activities. In the early 1960s a digital computer for the Titan was modified and submitted to Dr. Wernher von Braun and his NASA team at Huntsville, for evaluation as the guidance computer for the Saturn launch vehicle.

Art Cooper, a former B-24 navigator/bombardier, who is now FSD's Space Shuttle pro-

gram manager, recalls the occasion. "We put the computer in the back of a station wagon," he says, "drove it down to Huntsville, plugged it in at the Redstone Arsenal, and it ran for a full year without failure."

For the later Saturn launch vehicles, the Saturn 1B and Saturn V, NASA wanted a more sophisticated computer that could run, on the average, for 25,000 hours without failure. FSD met the challenge with an 80-pound, triple-modular, redundancy computer that could perform over 10,000 computations per second, use only 130 watts—about the power of a good-sized light bulb—and fit neatly into a package the size of a suitcase. It was aided by an input-output device called a data adapter, of a similar size.

The new onboard computer played a key role when an FSD engineering group moved to Huntsville to assemble the infinitely complex instrument unit (IU) that sat atop the upper stage of the Saturn launch vehicle just under the Apollo spacecraft. Shaped like a ring, it was 22 feet in diameter and 3 feet high. Into that confined space, FSD integrated 57 major components comprising 5 subsystems.

The prime mission of the IU was to guide, navigate, and control the Saturn launch vehicle from lift-off into a parking orbit around the earth, and from that orbit into a trans-lunar trajectory. When Astronaut Neil Armstrong, the first man to set foot on the moon, said: "Saturn gave us a magnificent ride," he was paying tribute, at least in part, to the flawless guidance system.

That was in July 1969. But before that three-man crew

landed on the moon, considerable effort had gone into both the Mercury and Gemini programs. Unlike their Project Mercury predecessors, Gemini astronauts flying through space at 17,500 miles an hour had an advanced computer on board to navigate and guide their craft. This FSD computer—the first ever used in a manned spacecraft—permitted the crew to carry out many maneuvers in space, such as orbit shifts and rendezvous.

In May 1973, another Saturn instrument unit guided the unmanned Skylab into orbit 270 miles above the earth. Twin System/4 Pi computers oriented the 118-foot-long vehicle so that its windmill-like solar panels, a source of electrical power, faced the sun for maximum efficiency. The computers also controlled docking maneuvers as different crews ferried between earth and the experimental laboratory in an Apollo command module.

Skylab carried its crews 2,476 times around the earth. It contained the most sophisticated scientific payload ever put in orbit. Observations from outer space indicated the possible site of ore deposits, fishing grounds, crop disease, and weather patterns. Eight telescopes, all controlled by computers, relayed detailed data about the sun's turbulence back to earth.

By the late 1980s, dozens of other experimental spacelabs may well be circling the globe, at far less cost per payload, as the result of the Space Shuttle program for which FSD is developing guidance systems for ascent orbital mission, reentry, and landing.

The Space Shuttle will operate somewhat like a pickup

truck. A manned orbiter will carry a payload into space, eject it at precisely the right moment, and return to earth, where it will land like an airplane. Then it will carry a new payload into space. It is the reusable aspect that will cut down program costs.

Although the Space Shuttle draws from existing space and avionics computer technology,

the software effort will require complex new programs. Programming now under way at Houston involves early stages of mission control center software development and on-board programs, as well as those needed for the ground-based software development laboratory. All told, the shuttle programming represents a \$60-million package through

the late Seventies.

And yet, despite the excitement generated within FSD by the Space Shuttle, it may well be that the space program, in a symbolic sense, reached its high point this past July when America's Apollo, supported by FSD people, and Russia's Soyuz docked in space. It was ironic, indeed, that a program fostered by international ten-

sions a quarter-century ago had at long last culminated in a peaceful rendezvous in space.

It was an event that some see as nothing more than a symbolic gesture; but others feel it represents the beginnings of a real accommodation with the Soviets—at least in the field of outer space technology. □

SAFER TRAVEL IN THE AIR

Each year, 28 million passengers routinely board commercial flights to fly within the United States. Yet few are aware of the major contributions made to their safety over the past decade by more than 600 members of the Federal Systems Division.

On August 26, the radar data processing phase of the Federal Aviation Administration's en route air traffic control system, in which FSD people have played a major part, was completed when the last of 20 centers went into operation at Miami, Fla.

The system enables air traffic controllers at the 20 FAA centers across the U.S. to monitor and assist domestic flights from the time they leave the control area of a particular airport until they arrive within the control area of their destination.

In the past, controllers received only a two-dimensional representation of aircraft position—range and bearing—on their displays. Now, instruments installed aboard aircraft transmit altitude data to radar antennas on the ground. The coded information is correlated with aircraft identification and automatically presented to the controllers on their displays.

FSD's role? It installed and checked out the central computer complex for each of the 20 centers, developed programming systems for them, and integrated the entire system. The IBM 9020 computers at each center required more than 100 programs for the processing of radar and flight planning information.

At a press conference, Acting FAA Administrator James E. Dow said: "The last center marks the end of the manual approach to air traffic control and gives us a semi-automated system that we can augment, refine, and more fully automate to handle following generations of en route air traffic."



A NEW UNDERSEAS WORLD

Projects in aerospace preoccupied the Federal Systems Division for almost a quarter-century. But in May 1970, the division won a Navy contract to develop the first computer-controlled digital sonar system. Designated AN/BQQ-5, the contract turned out to be as significant as either the B-52 or SAGE.

The Navy project falls within the broad category of anti-submarine warfare. Since winning the contract, the division has plunged deeply into sonar development—so deeply, in fact, that FSD today ranks among the most knowledgeable producers of sonar equipment anywhere.

What made the Navy turn to FSD in the first place for sonar systems? The answer lies in the marriage of sonar and digital data handling systems, which give ships of all kinds a brand new capability.

An advanced sonar system acts as the eyes and ears of a ship. It detects all sorts of sea sounds through an array of underwater hydrophones clustered inside its bow. Myriad sea noises—from the piercing whistle of porpoises to the chug of surface transports—are converted into electronic impulses, which the computer interprets.

Why this sudden surge in underseas activity? The answer seems to lie in the difficulty in detecting the whereabouts of missile-bearing submarines. They can prowl the ocean depths unseen and fire their warheads at a target from any of the major oceans of the world. For that reason, there has been much talk in military circles about a "submarine gap." The U.S. goal, however, isn't just to increase the size of its surface and submarine fleet; it's also to improve the technology of undersea detection.

Within a few years, the shipboard portion of FSD's population has grown from zero to more than 1,900 persons, nearly 1,600 of them in

Nuclear-powered submarines first went into service in the early 1960s. In 1979, the Navy is scheduled to launch its third-generation nuclear sub, the Trident. It will measure nearly two football fields in length and displace nearly 16,000 tons.

the Washington, D.C., area.

"Our initial problems in Manassas were largely manpower ones," says Albert F. Zettlemoyer, FSD vice president for shipboard and defense systems. "We had to match the right managers to the right programs, and we had to move large numbers of people from Owego and elsewhere to a new location. We also hired a lot of local people for our manufacturing."

"Now," Zettlemoyer adds, "we're producing sonar systems at the rate of one per month for the nuclear attack submarines. These systems will be delivered to shipyards throughout the country and will significantly enhance the country's antisubmarine warfare strength."

For the attack submarine, the 15 tons of equipment must be assembled inside the hull in a tightly confined area, and finally tested in rigorous sea trials. Between September and December 1972, five different IBM crews went to sea for two weeks each to prove out the equipment.

The new missile-carrying Trident will be the largest U.S. submarine ever built. FSD not only has a contract for the sonar system, but also for the integration of all command and control computer-related instrumentation. The project is the most impressive systems integration responsibility since the instrument unit for the Saturn/Apollo moon shot.

One unusual aspect of the Trident integration project is that the equipment will be assembled, tested, and certified

by the Navy before it is installed in the sub. This will do away with the need for extensive dockside testing. It is now being assembled on land in Newport, R.I., where FSD is working as a subcontractor to the Electric Boat Division of General Dynamics. The system, tested on land, will be lowered, in major units, into the sub through an extra-wide, 6-foot diameter hatch.

"It's the first time the Navy has ever attempted a program like this," says Chuck Slonim, FSD manager of Trident command and control system integration. "It permits more standardization and far easier testing."

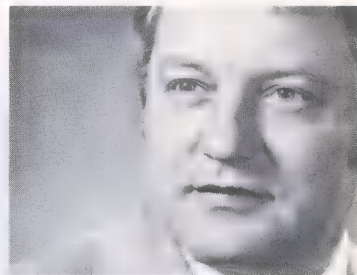
From these submarine-based sonar systems, it's a logical step to broader ocean surveillance applications. Here, too, FSD is involved. For surveillance projects, it developed a special-purpose computer for the Navy, called the Advanced Signal Processor (ASP).

ASP will have many different applications. One of the most important will be in a Navy program called LAMPS (Light Airborne Multi-Purpose System). Last year, IBM was named systems prime contractor for LAMPS—the first such role for the company in a Navy weapons system. FSD people in Owego will be responsible for the development, integration, and performance of all helicopter and shipboard LAMPS equipment. LAMPS ties together a search helicopter and a ship in tracking down submarines. The helicopter, equipped with radar and sonar devices, transmits signals back to the ship as it ventures over the sea. Ultimately, 30 destroyers and 50 patrol frigates will have this kind of surveillance capability.

How significant are these projects? Observes Zettlemoyer: "It seems pretty certain that our competence in sonar and underseas surveillance technology will keep us occupied in the national interest for quite some time." ■



*James A. Bitonti,
Operations*



*J. Kenneth Driessen,
Avionic Systems*



*Joseph M. Fox,
Civil and Space Systems*



*Jack O'Malley,
Marketing*

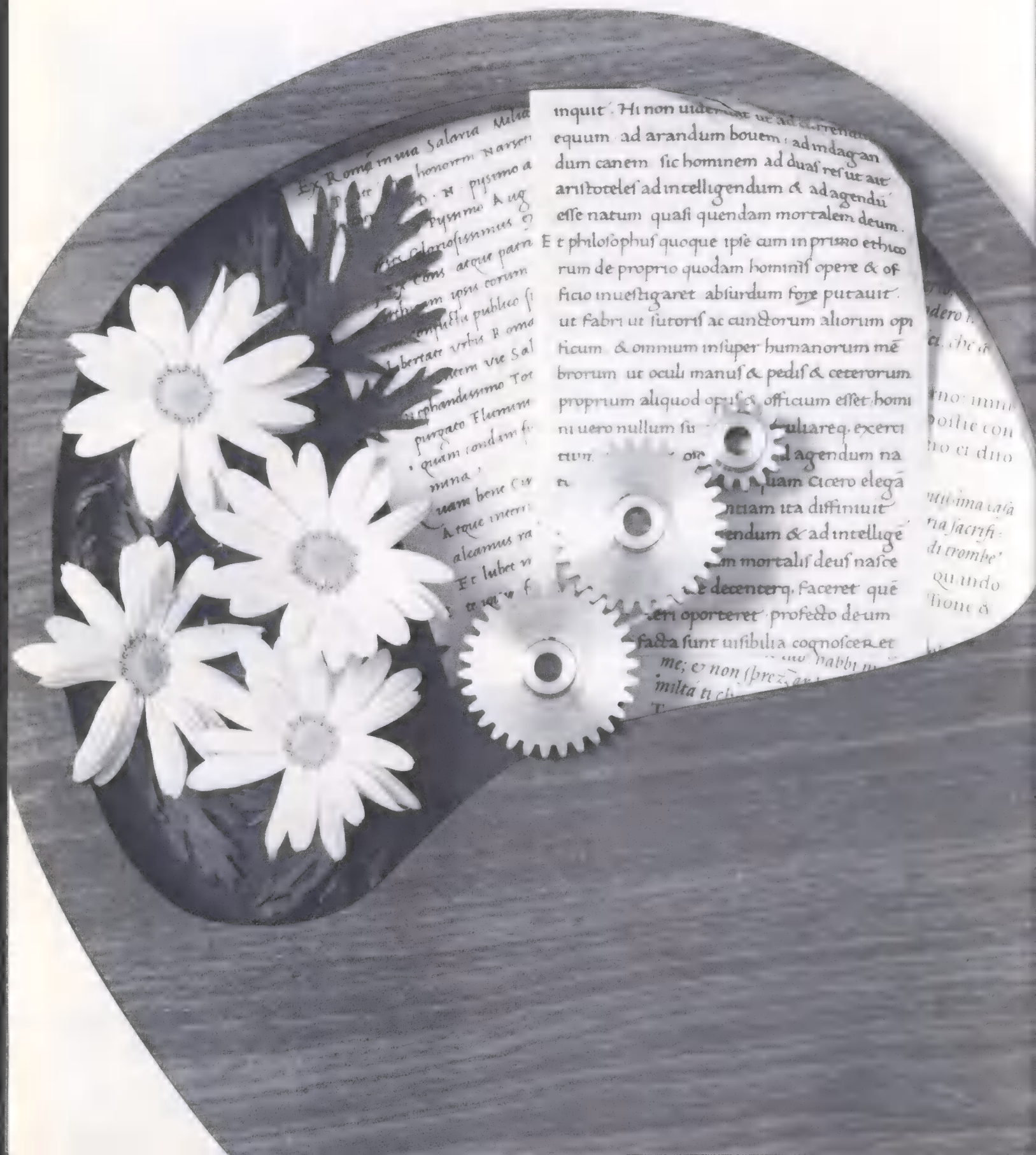


*Larry Sarahan,
Technology*

*Albert F. Zettlemoyer,
Shipboard and Defense Systems*



Why you'll



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never forget what's-his-name

by Lee Edson

In a Moscow theater on the Russian borscht circuit some years ago, "S. the Great" was the act that packed the house. In his routine, S. would begin by closing his eyes and listening while somebody in the audience stood up and read off a list of nonsense syllables—groups of meaningless letters—along with dates that had no significance. As soon as the speaker finished, S. would write on a blackboard every syllable and number that had been called out. He would do this with a dozen, two dozen and—as the waves of applause crescendoed—with as many as 70 items at a time. For an encore, what's more, he would erase what he'd written and rewrite the entire list of nonsense syllables and dates—backwards.

"S. the Great" was no fraud. He was a mnemonist, or memory expert, one of those rare people (only a few have been known to science) who can recall everything they see or hear, no matter how trivial, months, and even years later. This unique gift brought S. to the attention of Dr. Alexander Luria of the University of Moscow, one of Soviet Russia's leading psychologists, who made a special study of S.'s prodigious memory. Subsequently he detailed it in a now classic book on the subject, *The Mind of a Mnemonist: A Little Book About a Vast Memory*.

S.'s power enabled him to remember not only words and numbers, Professor Luria found, but sounds and images as well. Possessed of an ability known as synesthesia, or sensory crossover, S. found that through some mysterious process in his mind, sounds would turn into color and touch sensations.

The story of S. demonstrates the po-

tential for human memory. Most of us don't have memories of such encyclopedic power, but we do nonetheless have remarkable storage capacities in the three-pound corrugated tissue we call the brain. Without trying too hard, we can remember, or at least recognize, perhaps 50,000 words and several billion stray items or images. We can recall a face we saw just accidentally years back, recite a poem or sing a song we memorized in our childhood. We may recall scenes from our earliest years without losing our grip on the phone number we memorized yesterday. A recent test of individuals out of high school for 15 years showed that 90 percent of them could recall the faces of people they hadn't seen since graduation.

Whatever our capacities in the memory game, most of us would probably like to do better. We'd like to be able to remember names of business acquaintances, match name and face at a party, improve our ability to memorize speeches, or simply be able to recall the right word or joke at the right time.

In the last few years, scientists have been probing the enigma of memory and have come up with some findings that illuminate its workings and its role in nature.

They have found, for instance, that memory—the interface of past and present—is an ingenious survival tool deeply embedded in the evolutionary process. The first true signs of memory are found in the flatworm, a tiny creature with a primitive nervous system. This worm will not normally respond to light, but it can be educated to contract its body when a light shines.

On higher branches of the evolutionary tree, some scientists have suggested, memory broadens and its span lengthens. A cuttlefish can remember an impression for 27 days. But a trout can do so for 150 days (although some fishermen think forever). And an elephant,

Freelance science writer Lee Edson, whose articles frequently appear in The New York Times Sunday Magazine, is the author of the prize-winning book, How We Learn, published by Time-Life Books.

like man, can remember for its lifetime.

Psychologists find it convenient to divide man's memory into three distinct types:

- Sensory—seeing, hearing, smelling;
- Motor skill—like jumping through a hoop, a skill the human being shares with animals;
- Verbal—reading, thinking, speaking, all three unique to man.

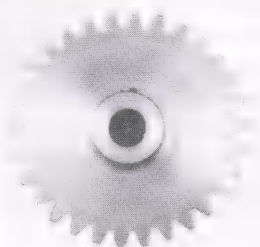


Sensory memory, particularly when it's visual, is probably the most exhaustively studied of the three forms, and the strongest and most enduring kind of memory in the human brain (just as smell is apparently the most enduring form of memory in the animal). How many of us, for example, can remember faces, even those we've seen but once, without ever recalling the name?

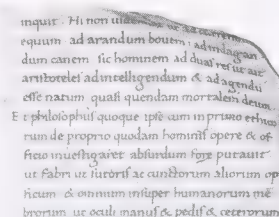
The existence of eidetic imagery, or photographic memory, which S. had in the extreme—once regarded as an absurd notion—is now well-documented. Leonardo da Vinci had such a memory; he could draw a detailed portrait after seeing a subject once. So did Napoleon; he could draw the details of a military map after just a single glance.

Eidetic memory has a counterpart in music, in the form of tonal recall. Arthur Koestler reports that Toscanini could remember a score after hearing it once or twice—and could repeat it 40 years later without ever seeing it in the interim. Walter Gieseking, the gifted German pianist, once promised a composer he'd play one of the man's original compositions and promptly forgot about it until the day of the con-

cert. During intermission, he glanced at the seven-page score and played it entirely from memory.



Motor skill memory isn't commonly thought of as memory, mainly because it is memory of *how* rather than *what*. However, motor skills, which are the product of conditioned learning, are found to be a very tenacious form of memory. Everyone is familiar with the fact that once a person learns to swim, or ride a bike, the know-how remains virtually throughout a lifetime.



Verbal memory is the most important form of memory for what is popularly known as "education." On a day-to-day basis, we must remember a host of facts, such as the earth is round, or the sun rises in the east, or that a dog barks. We never forget concepts. Some of them are so deeply ingrained and incorporated into our internal view of the world that we no longer even think of them as memories. Without such a store of verbal memory, however, civilization could not progress, for there would be no instrument to carry knowledge from generation to generation.

Regardless of the kind of memory involved, the process of remembering seems to be the same: The memory is registered or acquired (that is, certain sensory data are selected from the vast flood that pours in on our senses); the data are stored; and ultimately they are retrieved. Of these three stages, scientists have spent most of their time studying the storage and retrieval of memory and the mystery of forgetting.

Scientists spent a number of years hunting fruitlessly for a memory center, largely because of the influential psychological notion that the brain was sectioned into compartments, each holding the secret of a different behavior.

The death blow to the memory center idea was dealt in the last few decades by Karl Lashley of Harvard, a physiological psychologist who devoted much of his life to searching for the trace in the brain—known as the engram—where memory was supposed to be recorded. Lashley's method was to train rats to run a maze. Then he removed a piece of brain tissue and checked to see if the rat still remembered its lesson. Lashley expected that eventually the animals would fail to remember, but they continued to run the maze properly with only a quarter of their brains left. Lashley therefore concluded that the entire brain was involved in memory processes.

At present it is thought that memories are deposited in the form of electrical and chemical changes. The transient electrical changes are those of short-term memory (such as a phone number you just looked up). The permanent chemical changes are those of long-term memory, such as the things you recall from childhood.

In the case of short-term memory, Dr. Roy John of New York Medical College has shown recently that cats can actually make electrical facsimiles of something they've learned, and they will conjure up this facsimile, which appears as a brain wave pattern on an electroencephalograph, in the absence of the stimulus that caused the origi-

nal learning. Dr. John, who has been using a computer tied to an EEG machine to record the constant dynamism of thousands of neurons firing at the same time, says that many anatomical regions of the brain are involved in creating this facsimile.

Nobody knows how short-term memory drops into deep storage to become long-term memory, but psychologists now believe that this form of memory is maintained by processes affecting billions of protein molecules in the brain.

"Only changes in molecular structure could account for the indestructibility of long-term memory," says Dr. Samuel Barondes of the University of California at San Diego, who has pioneered in the chemistry of memory. Last year, Dr. Barondes conducted some experiments in which mice were trained to press a small object to escape a shock and then given a drug that completely stopped the formation of brain protein. The mice were then tested to see if they remembered the training and compared with other mice with identical training that had not been given the drug. Dr. Barondes found that in blocking the formation of protein he had also blocked the formation of long-term memories.

The storage of memory would be pointless if nature provided no way for the individual to retrieve what was wanted when it was wanted. How is this done? And why do we sometimes forget? Some scientists, to be sure, think that we never really lose a memory, that everything we experience is filed away somewhere in the hinterland of the brain, and that all it takes to bring a memory to the threshold of awareness is the right cue or trigger (a mental string on the finger). Proust's great novel, *Remembrance of Things Past*, describes in vivid poetic detail how memories are recovered and brought to consciousness through special scents and sounds.

For many of us, however, memories are elusive affairs that often have to be recovered the hard way—by a delib-

erate and painful search through the cerebral file, forcing oneself to remember through stray association. If, for instance, you've been to a social gathering or meeting and tried to remember the name of somebody you know you met once before, you probably have encountered the frustrating tip-of-the-tongue phenomenon: gone through the trial-and-error process of trying to link the individual with the sequence of events under which you met. You may have tried to visualize the card the person presented, or a name spoken in introduction, or an amusing or odd link that you can associate with the individual. The chances are the name won't come back until a time when you don't need it.

Can this retrieval process be improved, as the so-called memory experts claim, and, if so, to what extent? To answer, one should realize first of all that memory is not a muscle, so there is no way to exercise it and expect a better product, as you might from a tennis arm. Memory, like intelligence, is fairly constant—until probably senility or illness intervenes. On the other hand, psychologists have learned enough about memory to show us ways by which it can be artificially stimulated into serving us more effectively.

One of the things they've learned is that the process of everyday forgetting is not the result of decay, or the fading of a canvas, or the loss of brain neurons, but very often a process of forcing memories deeper into the recesses of the cerebral labyrinth, where they interfere with other memories and be-

come inaccessible. This process, known technically as proactive inhibition, is best described by the anecdote of the professor of ichthyology who complained that each time he learned the name of a new student he forgot the name of a fish. As Professor John Ceraso of Rutgers puts it: "What was once isolated is crowded with other [memories] and becomes out of reach."

The so-called absent-minded professor is the traditional example of the forgetting process that continues to evoke amusement—probably because it so often happens to people who are regarded as geniuses. Why are professors with encyclopedic memories for their specialty absent-minded? This remains yet another unanswered question for the memory experts and psychologists.

Typical of the stories told about this phenomenon is the probably apocryphal anecdote about Albert Einstein. He excused himself from a group of dinner guests to change his tie, which his wife had found atrocious. After half an hour had passed, Einstein had failed to return, and his puzzled wife went to look for him. She found him sound asleep. Evidently, when he removed his tie he found it in line with his normal procedure for retiring, continued the process and went to bed, forgetting his dinner party and guests.

Whether one is an Einstein or just someone else, one thing is certain: Nobody has yet developed the ability to remember everything. There may be someone in the world who can, but the name slips our mind. ■

Drawing by Wm. Hamilton; © 1975
The New Yorker Magazine, Inc.



"Can you believe the human mind! Do you know that at this exact minute I'm thinking of amino acids, Thomas Jefferson, and you?"



A black and white photograph of a desk. On the left, a large lamp with a glass chimney and a metal base is lit. Below it, a small clock is visible. In the foreground, a pair of glasses rests on a newspaper with the word "Tribune" visible. A book is open in front of the glasses. The background is dark and out of focus.

DESK-TOP COMPUTER

On September 9, IBM literally took the message to the media. Ordinarily, the company might have held press conferences at a headquarters location to introduce its newest product—a portable desk-top computer.

But the General Systems Division, which developed the computer and will market it, came up with a new twist in IBM computer product announcements.

Because the new IBM 5100 portable computer is small enough to carry, GSD decided not to call the press into its Atlanta Headquarters for the announcement. Instead, 15 teams of men and women, each equipped with a spanking new computer, took the new product to editors and reporters in scores of metropolitan newsrooms across the nation, plugged it into the wall outlets, and demonstrated it.

The message? It's small but powerful. IBM has taken another major step in reducing computer size and costs—less than 10 months after announcing System/32, at the time IBM's smallest computer product.

The 5100 is comparable to the IBM 1130 in storage capacity and performance. It is, however, dramatically smaller; almost as small, in fact, and almost as easy to use as an IBM Selectric Typewriter. And it weighs only 50 pounds compared to the 1130's half a ton.

"The new portable computer," said C. B. (Jack) Rogers, Jr., IBM vice president and president of GSD, "is designed to put data processing power within arm's length of today's problem solvers."

Among the features included in the new computer are its own distinct tape cartridge for storing programs and data, a TV-like display screen that can display up to 16 lines of 64 characters each, and a typewriter-like keyboard plus a 10-key calculator keyboard. Optional equipment includes an auxiliary printer and an auxiliary tape unit, and an adapter that allows the 5100 to operate as a communications terminal to a remote System/370.

There are 12 models of the 5100—varying by programming language (APL and/or BASIC) and storage capacity. Prices range from \$8,975 to \$19,975, and the computer is offered for sale only, not for lease. Also available with the computer are three program libraries, providing more than 100 processing routines applicable to mathematical problems, statistical techniques, and financial analyses.

The 5100 was developed at GSD's Rochester laboratory and will be produced at the division's manufacturing plant there. "It's got every sign of being a winner," says Rogers, "especially with businessmen, engineers, scientists, and other professionals who want as much information at their fingertips as possible." ■

ECONOMIST PAUL A.

SAMUELSON ON G

A few purely personal observations from a Nobel Prize winner

Growth must be a thing of the past—that's the only conclusion you can come to if you subscribe to the famous Club of Rome study on the limits of growth, produced at M.I.T. Natural resources are finite and so, according to this new computer version of the Malthusian Theory, continued population growth must result in a decline in the standard of living, to say nothing of an overcrowded and polluted environment.

So they say. But by the year 2000, when economic historians look back on the last quarter of the 20th Century, I doubt they will find the facts have followed the script of these Club of Rome predictions. Rather, I would guess, that although there will be a natural fall-off in the rate of population growth almost everywhere, world population will be billions higher in 25 years. And yet for all these billions, for the most part, material living standards can be expected to continue their long historical climb.

Let me review the evidence on which I base these predictions. You can then form an opinion of your own, and, if you wish, modify my guesses.

So far in the 1970s, total world Gross National Product, expressed in real terms after adjustments are made for price inflation, has been growing at an average annual rate of perhaps 5 percent. With world population growing at about 2 percent per year, this means that *real per capita income* has been growing about 3 percent per year on the average.

Paul A. Samuelson is a professor of economics at the Massachusetts Institute of Technology. He was awarded the Nobel Prize in Economic Science in 1970, and is the author of numerous books on economics, including Economics, one of the most widely used textbooks in the field.

By contrast, in the decades around 1900, it has been estimated that total world GNP grew only 2 or 3 percent per year, with average per capita income scarcely rising at all as population soared.

The United States with only about 6 percent of world population now enjoys a bit more than 25 percent of world GNP. However, at the end of World War II, the U.S. share was almost 50 percent. In the 1950s it sank to below 40 percent. In the 1960s, to below 30 percent. If this continues and the world develops as it ought to, by the end of the century, the U.S. share should be below 20 percent.

As an American, but also as a citizen of the world, I rejoice in this salutary trend. The rest of the world's gain is not our loss. Now that a typical Swiss and Swede have almost as much real income as my American neighbors, we in the United States still get every bit as much pleasure as we ever did from our increasingly comfortable standard of life.

What I do regret is that the prizes in the growth sweepstakes have been going, not to the undeveloped world with its historical poverty, but rather to the more affluent economies of Western Europe, Australasia, and Japan. These countries deserve their new sprint toward prosperity. But I wish that the same good fortune could come to India and Bangladesh, to Egypt, Haiti, El Salvador, Ghana, and Argentina.

It is not true that the less developed countries fail these days to make progress. What would have been considered miraculous growth in the old days of undiluted capitalism has been taking place in recent decades in Taiwan, Thailand, Mexico, Singapore, Puerto Rico, Spain, and in Eastern European socialist economies like that of Bulgaria. This

is without regard to what the accidental discovery of rich oil deposits can do for a Venezuela, Nigeria, or a Persian Gulf sheikdom.

But, alas, the picture is spotty. A Brazil may flourish where a Chile will stagnate. And many Asian and African countries, freed at long last from the fetters of colonialism, have introduced elaborate plans for socialism that do not seem to be worth the paper they were written on.

So much for the present and past. What about the future? Will new rules apply? Is the fourfold increase in the price of oil, engineered by the Organization of Petroleum Exporting Countries (OPEC) cartel, merely one sign that the day of judgment is fast approaching when scarce natural resources will have been exhausted? Are repeated Soviet grain

GROWTH

purchases an omen that the number of hungry stomachs is finally outstripping the amount of food that men can wrest from the soil?

No scholar has the right to be dogmatic about the future. *But, in my opinion, the quantum jump in oil prices is much more a reflection of a newly formed monopoly than of actual depletion of known geologic reserves.* If Saudi Arabia and Kuwait threw upon the world market all the oil they were capable of producing, in the same fashion that such countries used to do, we would many times in the next ten years witness sharp drops in world energy prices.

I am not one of those economists who constantly predict that the OPEC monopoly will break down. But I am one who calls a monopoly a monopoly.

Similarly, consider prospects for food production. It is not the case that agriculture experiences less technological advance than industry. Historical statistics show the opposite to be true.

It may be that the earth's climate is now going through a new cycle. Perhaps in two centuries we shall be in a new Ice Age. Perhaps the Sahara and the Indian Peninsula are in for an extraordinary frequency of droughts and disappointing harvests. But knowing the difficulties of identifying *genuine* rather than *spurious* statistical cycles, I should not like to bet that scientists' discoveries of new hybrid grains, pesticides, fertilizers, and improved farming methods will lag behind the indicated rise in world population.

What one can legitimately fear is that certain regions will on numerous occasions in the next quarter-century experience disastrous crop failures and mass starvation. Hundreds of millions of people will at those times have to throw themselves on the mercy of the most fortunate world powers. One does not have to be a pessimist or a cynic to have serious doubts that the philanthropic response will be adequate to alleviate the human suffering. Nor will this gloomy foreboding be exorcized by any international stockpiling scheme.

Two decades from now, an observer of the world from outer space at first glance could be led to conclude that matters will not have changed much since 1975. The highest

standards of living will still be in the Temperate Zones—in Europe, North America, and regions below the Tropic of Capricorn. The tropics and the polar regions will still offer the greatest challenge to longevity and a comfortable life.

But a second glance could reveal some notable changes. Although Japan's miraculous growth of the 1950s and 1960s must, in all likelihood, abate somewhat, she still should be able to maintain a positive growth differential over other advanced nations of at least a couple of percent per annum. And because small differences like these accumulate like compound interest, they should bring the Japanese standard of living to the top.

How about other nations? For a country like Brazil, can one extrapolate a continuation of her recent spectacular progress? In terms of size, resources, and the cultural mix of her population, Brazil could be on the brink of a long-term takeoff. Temporarily, by virtue of her strong governmental structure, Brazil has avoided much of the turmoil and disorganization we see in some democracies, as their electorates experience "rising expectations" and give vent to a "rising insistence on entitlements." However, history shows that early economic successes do not always last in countries with strong governments. This makes it hazardous for the social prophet to extrapolate, over the long run, real annual growth rates for Brazil in the neighborhood of 10 percent. Still, if even 6 percent growth could be achieved over the long pull, that would bring Brazil to a preeminent economic position in Latin America and in the general range of affluence of Great Britain. This would indeed be a notable achievement.

It is still more dangerous to guess the future of China. Its stability and the degree of equality with which it shares what is still a low standard of living are impressive. But one must remember how promising the future of Soviet growth looked in the early 1930s, and how many have been the vicissitudes in the years since then. Beyond guessing that China will do better than India for the rest of this century, one must still reserve judgment.

Precision in long-run forecasting is a myth. Surprise never surprises the futurologist. Karl Marx, Oswald Spengler, Thorstein Veblen, Arnold Toynbee, and Joseph Schumpeter are more like poets than scientists—or even historians. The world as it is today was predicted by nobody. ■

WHAT SAMUELSON SEES AHEAD

- Improved living standards
- Japan at the top
- Brazil on a level of affluence with Great Britain
- China? 'Let's reserve judgment.'

Jamboree time in Norway

With an assist from a computer in Peer Gynt's backyard



Trains brought most of the scouts to the jamboree. Almost every available railroad car in Scandinavia was used to transport thousands to Lillehammer.



Muslim scouts at prayer in the fields at Lillehammer. Ten religions were represented at the jamboree, where four chapels were built for the occasion.

Right: The nights resounded with music as scouts sang and played the songs of their nations. These Rwanda scouts perform at a campfire concert.

Three of them came from Calcutta and across eight countries by bicycle. Forty came from Wales on the world's oldest wheel steamer. The rest arrived more conventionally—by plane, bus, car, or train. They were all there—18,000 strong from 95 countries—for the opening of the 14th World Jamboree of Scouts in the Norwegian village of Lillehammer on July 30th.

The seven-day jamboree had all the traditional trappings: physical endurance tests, handicrafts, sports, and a pervading good fellowship. But it also served up a few surprises. For the first time, scouts took part in a 24-hour mountain hike through countryside unknown to them.

And for the first time data processing was part of the scene.

IBM Norway installed a System/3 in a computing center on the site. It dis-

pensed 140,000 data cards, admitting each scout to nine activities ranging from city planning sessions to canoe paddling. The computer was also used to assure that the eight-man mountain-hike patrols would be comprised of scouts from eight different countries. In all, 1,500 patrols went on the hike.

The DP center supplied closing-day diplomas; and IBM word processing equipment helped produce the bilingual (English-French) daily newspaper called *Five Fingers—One Hand*, the theme of the jamboree.

The event had been meticulously planned for three years. Chapels, health clinics, performance stages, kitchens—all were in place by opening day.

Things began stirringly when the scouts lined up in the formation of a giant hand and heard King Olav of Norway declare the jamboree open.

After they replaced their neckerchiefs with official jamboree scarves, colored balloons were let loose with messages inviting others to come and visit.

The pace never let up. There were national days, a country fair with contests in greased-pole climbing, sponge throwing, and yelling (yes, yelling). At night, campfire areas were filled with the sounds of folk singing and dancing. An amateur radio station made contact with 1,428 stations in 79 countries. Scouts exchanged national stamps and made folding knives or jewelry from reindeer horns.

At the closing ceremony, fireworks spangled the Norwegian sky. Then, as thousands of candles were lit, the scouts struck up music on the marimbas they had made during the last day. It was, unmistakably and inevitably, *Auld Lang Syne*. ■



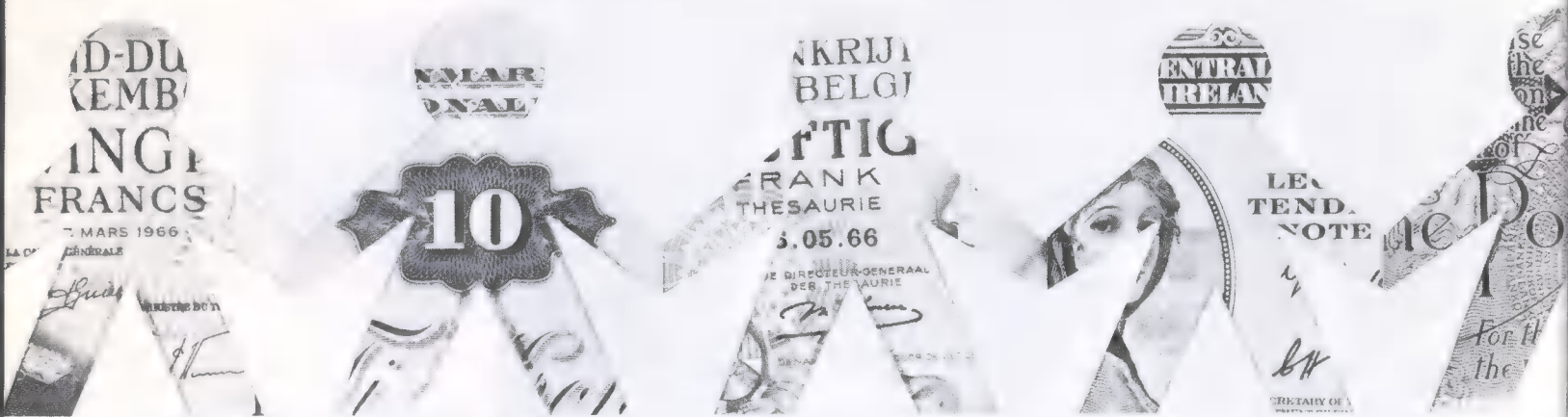
Walter Salicath, IBM Norway's chairman of the board



Above: Data card held by Tore Jarl Trondsen, manager of the System/3 computing center, was a scout's passport to activities.



Klippfish (split-cod) is tasted for the first time by a scout from the Philippines. The daily menu at Lillehammer featured everything from cornflakes to curry sauce.



E Pluribu

The European Community

by Richard M. Wight

Last June, the European Economic Community made headlines when the British people in their first-ever referendum voted by a convincing two-to-one margin for Great Britain to remain a member. Chances are that many Americans watching this happen weren't sure what all the fuss was about. The fact remains, however, that the EEC (also known as the Common Market) also wields considerable influence on American life.

People who equate cars with Detroit might be surprised to learn that the Community is the world's largest producer of automobiles.

Pittsburghers or people from Gary, Indiana, might not realize that it ranks first in steel production.

And except for those who have traveled abroad recently, it might be an eye-opener to learn that the standard of living throughout much of the Common Market is comparable to that of the United States.

The Community, as it's often called in its home city of Brussels, may still be, at age 17, an adolescent—but economically, it's undeniably adult. Basically, it's a limited economic union that provides its members with decided advantages when they trade with each other, and a common position when they trade outside the Community.

And trade outside they surely do. The nine member countries of the Community handle more in foreign commerce than the United States and Soviet Union combined. Furthermore, nonmembers no longer conduct trade negotiations with the individual members—Belgium, Denmark, France, Germany, Great Britain, Ireland, Italy, Luxembourg, and the Netherlands. Now it is all done through the Community.

Looking with perspective, the Community *slowly* is becoming more unified, and it *possibly* will become a political federation some day. The track record for international alliances is, after all, a spotty one. National sovereignty has been hard won, and often re-won, and surrendering even a small piece of it to a supranational organization is a difficult thing for nations to do.

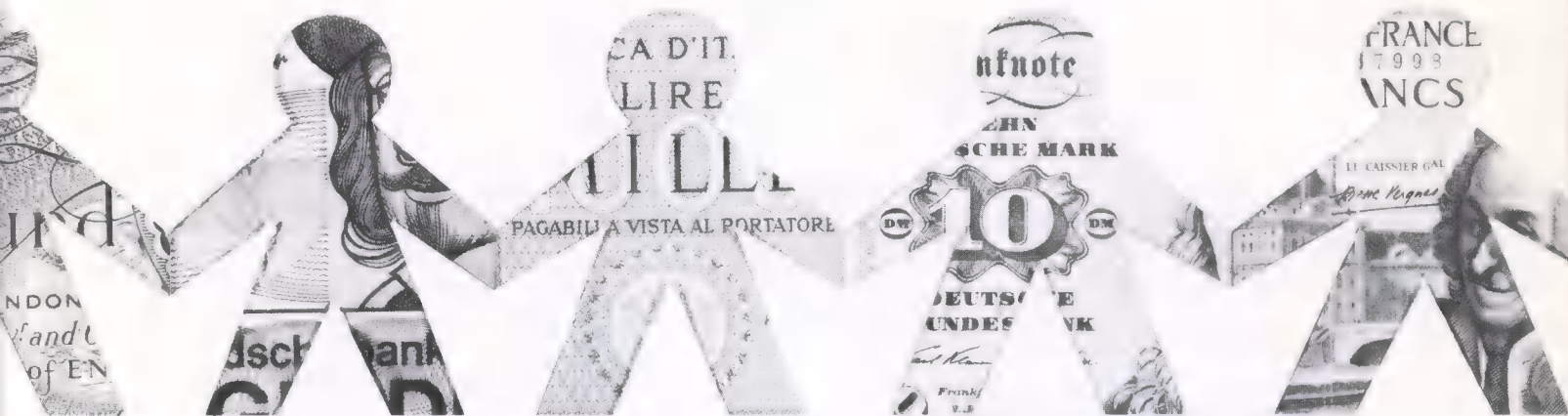
Nevertheless, even unfederated, the Common Market has had considerable impact on a company like IBM. Its relative success as an economic unit has led to more and more business for the company. The products that IBM markets are used in virtually every type of undertaking, so the great postwar economic growth in Europe has created opportunities in data processing and office products that not even the hardiest optimist could have foreseen two decades ago.

The Community is impacting IBM in other ways as well. It has formulated a data processing policy that is aimed at strengthening and supporting the locally owned (as compared, for example, with the largely U.S.-owned or Japanese-owned) segment of the European computer industry. It is taking great interest in such matters as privacy, data security, and product reliability; it is formulating policies in telecommunications and industrial research; it is considering Community-wide government procurement; and it is heavily involved in the mechanics of international business—customs regulations, taxation, insurance, accounting rules, and technical standards.

Many, if not most, of these activities continue to take place at the country level. But inch by inch, the tide is flowing towards Brussels.

* * *

A European statesman once observed that the only successful international alliances have been those organized against a common foe. He cited the North Atlantic Treaty Organization, which was formed to provide a military counterforce to the Soviet Union. He might as well have cited the ancestral roots of the Common Market, formed to fight Europe's common foe after World War II: human misery.



s Europe?

How communal is it getting to be?

Europeans themselves say today that recovery would not have been possible without outside help. It came in June 1947 when U.S. Secretary of State George C. Marshall proposed a major program of financial assistance. The touch of genius in the Marshall Plan was that it left the allocation of aid to the European countries themselves. The result was the Organization for European Economic Cooperation.¹

The OEEC made progress, especially in such areas as a credit system and the allocation of scarce resources, but it left intact the crippling holdover from the nationalistic 1920s and 1930s—the tariff wall each country had built around itself to protect home industry and home labor.

As it turned out, there were crucial events concurrent with the Marshall Plan. The waning threat of human misery was supplanted by a new threat to Western Europe when the Soviet Union's expansionist policies moved into high gear.

First came the takeovers in Poland and Hungary, then the 1948 coup in Czechoslovakia. The convalescing and still largely isolated countries west of the new Communist frontier felt dangerously exposed.

What brought them together was a remarkable idea conceived by French-

man Jean Monnet and advanced by the French Foreign Minister, Robert Schuman. They proposed that the entire French-German production of coal and steel be placed under a single high authority.

The proposal was extraordinary, not only in its own time but in retrospect—and on both economic and political grounds. Not only did it make another Franco-German war unthinkable, it made it economically impossible. For nations that had been at war with each other three times within the lifetimes of people then alive, the development was both startling and refreshing.

The result was the European Coal and Steel Community, which came into being in mid-1952 through a treaty signed by France and Germany, plus Italy and the three Benelux countries (Belgium, Luxembourg, and the Netherlands). It wiped out customs duties and other restrictions on the movement of coal and steel among the members. By 1960, iron and steel production had risen 75 percent.

¹ The OEEC was replaced in 1960 by the OECD (Organization for Economic Cooperation and Development), which has a broadened function and includes 24 countries, including the United States, Canada, and Japan.

² The six became nine in January 1973 when Denmark, Great Britain, and Ireland joined the Community.

The next step was to extend tariff-free trade to all goods. This came about through the Treaty of Rome, signed by the six member nations of the Coal and Steel Community,² and made effective January 1958. This created the European Economic Community.

A second treaty signed at the same time established the European Atomic Energy Community for the joint development of the peaceful uses of nuclear energy.

What the founders of the EEC set out to do was to establish a "common market" so that a manufacturer in Essen, or Dijon, or Liege could look at an international market the way he once looked only at the market inside his nation's borders, and make his business plans accordingly.

All customs barriers among members were to be abolished over a 12-year period. Actually, this was accomplished in 10 years. The results were impressive: From 1958 to 1970, trade among the six members increased 530 percent.

This elimination of tariffs, however, has not resulted in equalization of prices. Different rates of indirect taxation still exist throughout the Community. A German-made camera, to cite one example, does not sell for the same price in Paris as it does in London.

The common external tariff called for in the Treaty of Rome was adopted in 1968. This does not mean, however, that goods coming in from all countries encounter identical duties. The Community has negotiated a variety of trade agreements with nonmember countries. Some of these are industrialized countries holding what is called associate status with the Community and in many instances enjoying the same duty-free situation as do members. The same is true of most of the African states which are former European colonies.

Under the treaty's agricultural policy, today there is not only free trade within the Community in all major farm products, but also a uniform, maintained price to farmers in all nine countries for their products. By far the largest budget item in Brussels, this farm price maintenance costs the Community more than \$25-billion a year. There are many programs under way to improve farming efficiency and lower this cost.

The treaty also established the basis for the free movement of labor, capital, and business enterprises within the Community. Most progress has been made in labor: Community workers have priority in filling vacancies over workers from outside the nine countries. Furthermore, they retain their social security rights when they move from one country to another.

Abolished by the treaty was the old pre-war cartel system under which companies carved up markets and in other ways reduced or eliminated competition. At the same time, certain articles in the treaty—which are similar to the U.S. antitrust laws—established rules for competition and against the abuse of a dominant position.³

The treaty also established a political organization to direct the economic integration of the EEC. This is made up of four principal institutions or "branches" that can be related to like functions in a typical national government.

■ The EEC Commission initiates Com-

munity action. It is the working or administrative arm of the Community, with 7,000 staff people based in Brussels. It is a mixture of a cabinet, a civil service, and a legislative staff.

■ The European Parliament is made up of delegates from the nine member-nation parliaments. But the Commission's recommendations, which may be debated in the Parliament, are actually directed at the Council of Ministers.

● The Council of Ministers, the EEC's decision-making body, is made up of ministers who hold portfolios in their home country cabinets. The Council is the executive body of the EEC.

■ The Court of Justice plays the usual judicial role, ensuring the observance of law and justice, but only in matters under the EEC's purview.

Thus, the EEC system differs from a typical parliamentary system in that the "government" (the Council plus the Commission) is not part of the Parliament nor does it necessarily represent the majority view of the Parliament. In some respects, the system resembles the U.S. three-branch, check-and-balance form of government.

The Parliament has the power, which it has never used, to dismiss the Commission by a two-thirds vote. But in most respects, the Parliament has less power than a typical European parliament or the U.S. Congress. It is largely a consultative group and a forum for debate, although it is gaining in power.

* * *

It is not at all difficult to outline the directions that the Community *could* take. But given the political realities of Europe, it is almost impossible to predict what *will* happen. The step most likely in this decade—other than the direct election, country by country, of members of the Parliament—is the adoption of a statute that would provide for corporations to be chartered by the Community rather than by individual countries. Such a statute is seen as an important step toward an economically integrated Europe. It also could be a step toward Community-

wide companies in high-technology fields, as well as Community-wide government procurement.

The most discussed step beyond those is the establishment of a single European currency, a move that, practically speaking, must be preceded by a number of other changes. These come under the heading of "harmonization," a term that means the establishment of the same approaches to taxation, accounting, and other economic procedures in all member countries.

Over *that* very steep hill lie the possibilities of political federation. They are remote, but, in the eyes of the most dedicated "federalists," they are always there. Traveling Americans might think the principal hurdles are differences such as language or the other outward manifestations of culture. But Europeans have been living with these differences for centuries, and today they are not a major factor.

The real problems are far more deep-seated, much more related to the lingering lures of nationalism and to distrust or even fear of former enemies—or allies. One major EEC battle was over the admission of Great Britain. Two of Britain's World War II enemies—Germany and Italy—were already in. But it was her ally, France, under Charles de Gaulle, that worked to keep the British out.⁴

Nonetheless, the EEC, which many call Europe (even though it is only part of *Western* Europe and does not include other "Western" nations such as Austria, Finland, Norway, Portugal, Spain, Sweden, or Switzerland), slowly draws itself into a union. In July, for instance, the Commission proposed that the 125,000 lawyers in the nine member countries be able to plead cases throughout the Community. That

³ It is under one of these rules that the EEC is conducting an inquiry into IBM's operations in Europe to determine if the company has violated the Treaty of Rome. IBM maintains it has not.

⁴ The British, it must be noted, were somewhat fickle about EEC membership. The latest candidate for membership, Greece, wants very much to be in.

same month, the Commission approved proposals to set up an Export Bank to finance and insure high-value orders for third countries. The aim is large-scale financing of ventures like petrochemicals and civil engineering.

* * *

If the first half of Europe's Twentieth Century was dominated by leaders, good and evil, the second half—and

especially the final quarter—is shaping up as the people's turn.

It was two-thirds of the British people who elected to stay in the Common Market, even though the short-term problems for them are severe.

It was the incredible energy of the German people that brought that nation from postwar disaster to such a position of strength that the economic

gap between Germany and the other EEC countries is one of the organization's continuing dilemmas.

And, according to one eminent group of forecasters, it will be the French people, with their self-admitted obsession with material goods and a better personal living standard, who will push France past even Germany within a

(Continued on page 48)

Europe: Despite setbacks, still a growing marketplace

How big is that European market and what does it hold for IBM?

In 1974, for the first time, the collective Gross National Product of the nations of Western Europe exceeded that of the U.S. The forecast for 1975 is a continuation of this pattern, with \$1,657-billion GNP for Western Europe and \$1,523-billion for the U.S. The EEC Nine alone will come close to matching the U.S. GNP with \$1,308-billion.

IBM has an enormous stake in Europe. Most of the business of the Europe/Middle East/Africa Corporation, which serves 83 countries, is concentrated in just nine European nations. The potential, most say, remains great. For example, the EEC Nine have only about half as many computers as the U.S. Since the population of the U.S. and the European Nine are not that disparate (213 million for the U.S. and 260 million for Europe), and since their respective GNPs will soon be comparable, each might be expected to have the same potential. Predictions are that Europe will have 150,000 computers installed by 1980—three times the present number.

The DP business in Europe differs in many ways from that of the U.S. For example, the public sector is of far greater importance, representing about one-third of the business. Many European governments have adopted preferential purchasing policies in the public sector that favor European-based companies. The only way IBM can cope with such policies is to demonstrate to public sector purchasers that its products are superior to those of its competitors and, therefore, that it makes sense to waive the preferential purchasing requirement.

The EEC continues to encourage a community orientation to data processing in Europe. The Council of Ministers has called on the EEC Commission to submit proposals for joint projects on data processing applications, collaboration on standards and public procurement, and industrial development projects. These efforts are made under the Community's policy of developing a European-based industry capable of competing with what is referred to as "the dominant producer."

That policy is still questioned in some official quarters. A committee of the European Parliament, for example, has criticized the plan originally developed by the Commission for overcoming the alleged dominance of IBM. The committee said in a report: "Rather than pursue an over-ambitious and unrealistic aim, it would seem to make more sense for the Commission to encourage cooperation of European firms with *non-dominant firms outside Europe.*" (*Italics added.*)

What's the current outlook for IBM in Europe?

Going into 1974, it had been expected that, collectively, GNP growth in E/ME/A countries would be about 4.5 percent. As it turned out, the growth rate was about half of that. At the same time, inflation was about twice what had been originally expected. Despite these factors, IBM country organizations turned in the second-best year on record in Europe.

The European economy has been hard hit by the twin evils of inflation and trade deficits—with Italy, the U.K., and France particularly hurt because of their heavy dependence on Middle East oil. Europe as a whole is expected to experience a decrease in GNP of 1.3 percent for 1975. The slowdown has been caused by deliberate government actions to moderate inflation rates.

Costs, and their impact on doing business in Europe, remain a severe problem. This situation has been aggravated by the decline of the dollar. Despite the apparent moderation of inflation, economists see sharp increases in labor costs in Europe. This reflects the strength of labor and the desire of workers to "catch up" with severe inflation; and it indicates the continuation of a strong cost-price squeeze on business. Taking into account the dollar deflation, labor costs in Europe are beginning to equal or exceed those in the U.S.

Yet in spite of these sharply rising costs, growing industrial democracy, movements toward greater socialism, and a troubled short-range economic outlook, the European marketplace remains vigorous and continues to offer a healthy potential for growth in data processing equipment. ■

(Continued from page 47)
decade.

It will be the people of Europe, or at least most of Western Europe, who will decide, perhaps near the end of this century, whether or not to put aside the nation-state and choose instead a federation. The current outlook is that the political leaders will not promote this until Europe's adversaries—friendly, unfriendly, or both—look so strong that federation will be the only answer. But if that time comes, it would not be at all surprising to find that the majority of the people of Europe had already reached the same conclusion.

Unpredictable as Europe's future as a federation may be, however, the consensus today is that there will be no turning back to the array of economically isolated nation-states that existed 40 years ago. So whatever the political outcome, the European Common Market promises to be of great significance to IBM and the rest of the business community for many years to come. ■

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Think SEPTEMBER/ OCTOBER 1975

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Viewpoint

From John R. Opel. Some thoughts on why big business has a bad name. And what IBM employees can do about it.

IBM President John R. Opel recently spoke to a group of IBM executives at an international seminar in Washington, D.C. Excerpts follow.

I believe international corporations will be as permanent as the increasing interdependence of all nations.

I had occasion to remember that the other evening as I watched a program commemorating American independence. The Bicentennial program was sponsored by a Dutch oil company and a German automobile manufacturer. And I was watching it in my home on a television set made in Japan.

* * *

I'm asked about IBM's future as often as I'm sure you are . . . The market potential is there. We have the resources and the will to take the fullest advantage of that potential. There is nothing to indicate that our business will alter its traditional direction for the next decade. Most of the problems I see are also the traditional ones we are confident we can cope with.

The only major threat I see to IBM's progress is the increasing public hostility toward big business in general. And toward the internationals in particular.

* * *

A mood of public paranoia leads many to believe that for reasons of greed, business is concealing—

- engines that could run 100 kilometers-per-litre of gasoline;
- a cure for cancer.

These fantasizers are the ones who actually believe that companies like IBM make the foreign policy of the United States and dictate to other countries.

They also believe—and this one really gets me—that business welcomes periodic economic recessions because that puts labor right back in its place.

All this adds to the pollution of thought that presently fogs over so much of business' public image. And it's hard for our people not to breathe in some of that polluted atmosphere.

* * *

So I've been asking employees—and I urge you to do the same—to question some of the innuendos against IBM they hear and read from time to time. We're not asking for them to accept IBM as a spotless, fault-free organization. What organization is? We're not asking that they turn themselves into propagandists on our behalf. That would be especially damaging to our image. We're asking them to test these allegations against what they personally know about IBM and their colleagues . . . If we fail their test then let's find out where and how. And if they're right, let's work together to make up the deficiencies, however abstract they may be. ■

THE TRIBAL EYE

There are different ways of being human—many of them unknown, or barely known, to the so-called civilized world. In Africa, for example, the Dogon people of Mali have their own unique culture. In the Southwest Pacific, the Nambas have theirs. So do the nomadic Qashqa'i of Iran, and the Kwakiutl Indians of the American Northwest.

To find out how these and other tribal societies live, you can take the trip without benefit of jumbo jet or dugout canoe. It will all be there on your local Public Television station, beginning on Wednesday, October 15 at 8 p.m. (Eastern Time). It is called *The Tribal Eye*, a seven-part series of one-hour programs made possible by an IBM grant, and it will run through November 25, and be rebroadcast by many stations on Sundays from 6-7 p.m., Eastern Time.

Narrator David Attenborough, a noted film producer, and his crew spent two years on location to do the job—location meaning 16 countries and a global safari that took them from the numbing cold of the Arctic Circle to a parched wilderness south of the Sahara Desert. Gifts from the people they met were abundant, including a pig, a rooster, and a half-ton of yams and bananas—and local customs dictated that they be accepted. But one that Attenborough had to decline called for delicate diplomacy: An old chief in Benin, Nigeria, offered his 48-year-old daughter as a bride.

The Tribal Eye, in sum, is a rich fare of exotica—films of tribal societies, their rituals, and prime examples of their arts and artifacts, among them:

A "Man Blong" rite in the New Hebrides.

The dance of the cannibal birds and the potlatch, or gift-giving ceremony of the Kwakiutl Indians.

The spirit world of the Dogon, embodied in their artfully carved wooden masks.

The *haqueros*, or grave robbers, of Colombia (what they do is against the law, but it's rarely enforced because they search out gold figures and relics from the times of the Aztecs and Incas).

Here, then, are other ways of being human. Appreciation thus becomes a "two-way force," says Attenborough. "What we are doing is letting tribal art give us an insight into the cultures of these people and, at the same time, examining their cultures to help us appreciate their art.

"We had an appalling job trying to find a new word to describe this category of art. It used to be called 'primitive.' But now primitive is an offensive term. A lot of emancipated people from these cultures don't want to be categorized as primitive."

While the term "tribal" still raises a few objections, Attenborough allows, he feels that it is the best to be found—particularly when one considers the alternatives that were suggested. Would you believe: "pre-literate, non-industrial society"?

STARTING OCTOBER 15 ON PUBLIC TELEVISION



THE TRIBAL EYE

A seven-part series of one-hour programs on Public Television.
Made possible by an IBM grant. Starting Wednesday, October 15, at
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Migraine in the cities

In Latin America, as elsewhere, cities are up against it. How A/FE is helping
them focus much-needed attention on their difficulties.

Page 12

E Pluribus Europe?

A fresh look at the Common Market. What does it mean to IBM?

Page 44

Desk-top computer

It's portable—weighs only 50 pounds. It can be plugged into the wall.
And it's already a hit with customers.

Page 38

Miss America

She's the daughter of an IBM employee.

Page 10

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